Water System Improvements
Drinking Water State Revolving Fund
Project Planning Document

City of Mt. Pleasant

Project No.: 220532
May 10, 2023

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Prepared For:
City of Mt. Pleasant
Mt. Pleasant, Michigan

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ADD average day demand
City City of Mt. Pleasant
CMU Central Michigan University
DWSRF Drinking Water State Revolving Fund
EGLE Michigan Department of Environment, Great Lakes, and Energy
gpm gallons per minute
MCC Motor Control Center
MDD maximum day demand

MG	million gallons
mgd	million gallons per day
MNFI	Michigan Natural Features Inventory’
PLC	programmable logic controller
ppm	parts per million
SCADA	supervisory control and data acquisition
SESC	Soil Erosion and Sedimentation Control
WTP	water treatment plant

1.0 Introduction

This Project Plan was prepared by Fishbeck on behalf of the City of Mt. Pleasant (City) to obtain a Drinking Water State Revolving Fund (DWSRF) loan from the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The City's water system includes 6 vertical wells in 3 well fields, a horizontal groundwater collector well (Ranney Well Collector), a lime softening Water Treatment Plant, 2 elevated water storage tanks, 2 ground storage tanks, a high service pump station, and approximately 89 miles of water main. The City system is older, with the average age of water main over 60 years old.

The projects proposed in this Project Planning Document include:

- Island
  - Ranney Well Collector improvements
  - Ranney Building Electrical Improvements
    - Valve vault step-down transformer and lighting panel
    - Ranney Wells motor and VFD replacements
    - Wells 12, 18, and 19 motor starter replacements
    - Ranney Well Collector Building (Ranney Building) main circuit breaker, Motor Control Center (MCC), manual transfer switch, and pad-mounted transformer replacements (utilize existing workshop area for new electrical equipment)
    - Generator replacement and automatic transfer switch addition for the Ranney Building
- Water Treatment Plant
  - Treatment Process Improvements
    - Clarifier valve replacements
    - Filter Improvements
    - Recarbonation tank, piping, and valve improvements
    - Aeration tower rehabilitation
    - Chemical tanks replacements
    - Lime sludge improvements
    - Process flow meter replacements
  - Roof replacement
  - Generator and automatic transfer switch replacement and power distribution modifications
  - HVAC system replacements
  - Supervisory Control and Data Acquisition (SCADA) system upgrades (includes remote sites)
  - New raw water storage reservoir and low lift pump station with corresponding electrical power distribution (new pad-mounted transformer)
  - New finished water reservoirs, HSP building with pumps and appurtenances, corresponding electrical power distribution (new pad mounted transformer)
  - New transmission main.
- Distribution System
  - Water meter replacements
  - Distribution system valve replacements
  - Emergency connection with Union Township
  - Portable generator for Broomfield Well Field
  - Lead service line replacements

2.0 Project Background

2.1 Delineation of Study Area

Mt. Pleasant is in the heart of Michigan's lower peninsula along the banks of the Chippewa River. The study/service area generally corresponds to the corporation limits and is essentially land locked via the surrounding Union Township, which has its own water system. The Central Michigan University (CMU) is situated in the southern part of the service area. The service area is a mix of residential, commercial, and industrial users. Part of the City (with a population of 8,741) is located within the Isabella Indian Reservation. The City owns and operates a water supply, treatment, and distribution system that serves the City.

Refer to Figure 1 for the existing service area.

2.2 Land Use

Land use in the service area is a mix of typical single-family housing, agricultural, and university, as well as a mix of industrial and commercial zoning. See Map 1 for a complete view of the land use in the service area. The zoning is not anticipated to have major changes within the next 20 years.

2.3 Population Projections

The current population density of the area is shown in Map 2. The past and projected changes to population per the 2022 reliability study are depicted in Table 1 below:

Table 1 – Population

Year	Population
1990	23,285
2000	25,946
2010	26,016
2020	26,007
2025	26,130*
2030	26,252*
2035	26,375*
2040	26,497*

* *Population projections are based on an increase of approximately 25 people per year, or an increase of approximately 0.1% per year.*

In addition to full-time residents, CMU has a seasonal population of 27,000 students, faculty, and staff that contribute and increased seasonal demand. This increased demand is seen from September to May when school is in full session. Major population growth is not anticipated in the City.

2.4 Water Demand

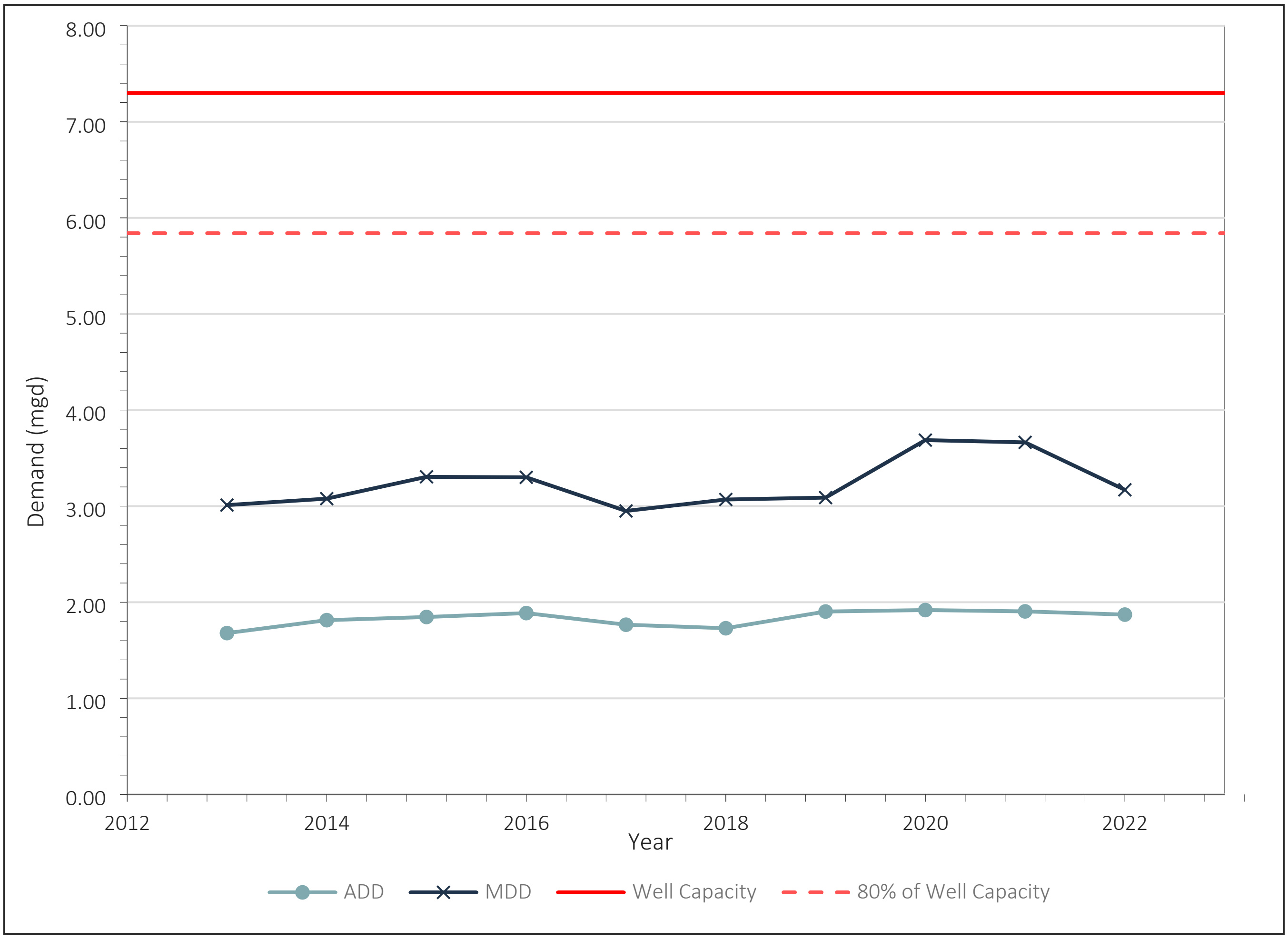
Fishbeck utilized the City's monthly operating reports to analyze historical water use for the years of 2013 to 2022. The average daily demand (ADD) is the average daily volume of water pumped to the system in one year. The maximum daily demand (MDD) is the maximum amount of water pumped to the system in a single day, annually. The MDD:ADD peaking factor of the system is the ratio between maximum and average daily demand for each year. The ADD, MDD, and peaking factor were determined and calculated for years 2013 to 2023; the historical demands are shown in Table 2 and in Graph 1, where they are compared to the well capacity (7.30 million gallons per day (mgd)) and 80% of said capacity (5.84 mgd). Typically, EGLE recommends water systems begin planning for an expansion when historical demands exceed 80% of the rated capacity of the system.

The ADD has remained relatively consistent over the 10-year historical period. The MDD has experienced more variation and is trending upwards slightly.

Table 2 – Historical Water Demands (2013-2022)

Year	ADD (mgd)	MDD (mgd)	MDD:ADD Peaking Factor
2013	1.68	3.01	1.79
2014	1.81	3.08	1.70
2015	1.85	3.31	1.79
2016	1.89	3.30	1.75
2017	1.77	2.95	1.67
2018	1.73	3.07	1.77
2019	1.90	3.09	1.62
2020	1.92	3.69	1.92
2021	1.90	3.66	1.92
2022	1.87	3.17	1.69
Average	1.83	3.23	1.76
Maximum	1.92	3.69	1.92
Standard Deviation	0.08	0.26	0.10
95th Percentile	1.97	3.66	1.93

Graph 1 – Historical Water Demands (2013-2022)



To project future water demands, the starting point for both the ADD and MDD projections was estimated. The starting point for the ADD was estimated using the average ADD from 2013 to 2022 of 1.83 mgd. The MDD was estimated by finding the standard deviation of the MDD:ADD peaking factor and adding 1.65 times the standard deviation of the dataset to the average peaking factor. An MDD:ADD peaking factor of 1.93 was used for MDD projections. Statistically, this value is predicted to be greater than 95% of the probable future values based on the dataset, assuming it has a normal distribution. This value was then multiplied by the average ADD to get the starting point for the MDD, 3.53 mgd.

Both the City's population and average water use have remained consistent over the last ten years. The City population is projected to increase slightly over the 20-year planning period. Based on this information, it is expected that water use will follow the slight population growth anticipated in the City over the 20-year planning period.

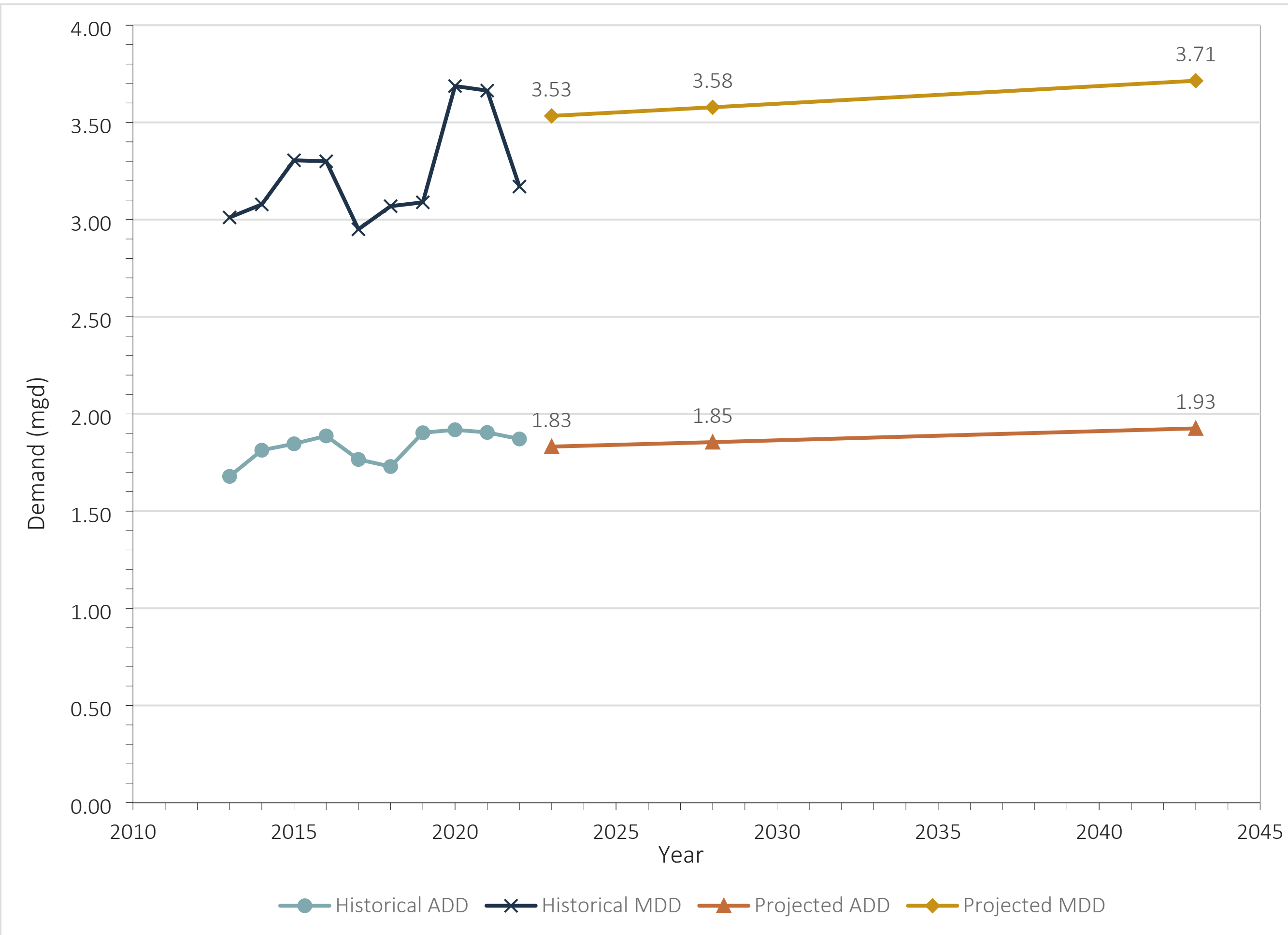
To determine a projected change in the ADD each year, the starting ADD was multiplied by an annual demand growth of 0.25%. The projected change in the ADD was then added to the starting ADD. This process was repeated for each following year, starting with the new estimated ADD.

Table 3, Graph 2, and Figure 4 indicate the historical datasets and projected water demands for both the ADD and MDD through 2042. In 2042, the ADD uses 26.4% of the well capacity and the MDD uses 50.8% of the well capacity. The City's current water supply will be operating within EGLE's recommended 80% capacity in the future.

Table 3 – Projected Water Demands Through 2043

Year	Projected ADD (mgd)	Projected MDD (mgd)
2022	1.83	3.53
2027	1.85	3.58
2042	1.93	3.71

Graph 2 – Projected Water Demands Through 2043



2.5 Existing Facilities

2.5.1 City System Description

The City's water system includes 6 vertical wells in 3 well fields, a horizontal groundwater collector well, a lime softening WTP, 2 elevated water storage tanks, the Island Facility with 2 ground storage tanks, a high service pump station, and approximately 89 miles of water main. All the wells and the horizontal collector are located on the south side of the Chippewa River and west of Mission Road. The City system is older, with the average age of water main over 60 years old. The material of pipe includes cast iron, ductile iron, PVC, and asbestos-cement. The water system currently services approximately 5,949 customers, including residential, commercial, and industrial. A meter at the WTP totalizes daily pumpage to the water distribution system and customer water meters are read/billed monthly.

The existing water system is included in Figure 2.

2.5.2 City Well System and Capacity

The active wells and their capacities are as indicated in Table 4.

Table 4 – City Active Wells and Permitted Capacities

Well Field Name	Well Name	Well Capacity (gpm)	Well Capacity (mgd)
Broomfield	Well No. 6	600	0.86
	Well No. 20	500	0.72
Deerfield	Well No. 16	580	0.84
	Well No. 17	340	0.49
West	Well No. 18	1,000	1.44
	Well No. 19	1,000	1.44
	Ranney Well Collector	2,050	2.95
	Total Capacity	6,070	8.74
	Firm Capacity	5,070	7.30

gpm – gallons per minute
mgd – million gallons per day

The West Well Field is located at the Island Facility (Island). It should be noted that Wells 18 and 19 cannot be operated at the same time due to issues with water quality and capacity; however, this does not affect the firm capacity of the raw water supply because the Ranney Well Collector is the largest well. The Broomfield Well Field is located south of Broomfield Street just east of the Intramural fields of CMU. The Deerfield Well Field is located near the intersection of Deerfield and Mission Roads. The current firm capacity of the existing water supply wells, including the Ranney Well Collector, is 7.3 million gallons per day (mgd), which is approximately 50.8% the projected year 2043 maximum day demand of 3.71 mgd.

2.5.3 Island

The Island location is remote and consists of the West Well Field, Ranney Well Collector and pump building, high service pump building, 2 ground storage reservoirs and valve vault. The Ranney Well Collector is located adjacent to the Chippewa River as indicated in Figure 3 and is the main source of water to the City, consisting of a well caisson and horizontal laterals extending from the base of caisson. The Ranney Well Collector has the lowest chemical and electric costs to operate due to its water quality.

A high service pump station on the Island pumps water from the finished water reservoirs to the City water distribution system using 4 high service vertical turbine pumps. There are 4 high service pumps. The capacities of each pump along with the firm capacity with the highest pump out of service is provided within Table 5. The pump station draws water from outer ring of the 1MG reservoir.

Table 5 – High Service Pumps

High Service Pump Name	Pump Capacity (gpm)	Pump Capacity (mgd)
HSP 1	1,850	2.66
HSP 2	1,720	2.48
HSP 3	1,720	2.48
HSP 4	1,800	2.59
Total Capacity	7,090	10.2
Firm Capacity	5,240	7.55

Finished water from the WTP runs through a gravity transmission main to 2 finished concrete water storage reservoirs at the Island. The first reservoir was built in 1963 and has a volume of 1MG. The reservoir is 100 feet in diameter and has outer and inner concentric chambers. The second was built in 1978, is 115 feet in diameter and has a volume of 2MG. Over the years both reservoirs have been rehabilitated to maintain system reliability. The concrete vault between the reservoirs includes influent piping, piping connecting both reservoirs and valves strategically located for isolation.

2.5.3.1 Existing Electrical System

A medium-voltage (primary) electrical service (8320-volts, 3-phase) is provided at the Island location. Power is distributed via pad-mounted medium-voltage (15 KV) primary switchgear to two 500 KVA pad-mounted transformers; one at the Ranney Building and one at the high service pump building. The primary switchgear is located near the 500 KVA transformer that serves the high service pump building. Both pieces of equipment need to be moved to be located outside the 100-year floodplain. Inside the high service pump building, 480-volt, 3-phase power is distributed via a motor control center (MCC) with a 3-pole, 600-amp main circuit breaker, 15 KVA step-down transformer, and lighting panelboard (LPA). The MCC includes four, Size 4 full-voltage, non-reversing motor starters that control four 100 HP high service pumps. One of the high service pumps includes an engine-drive so the pump can be operated during a power outage. The existing motor control center, step-down transformer, and panelboard should be able to be reused. It is recommended that the existing high service pump motor starters be replaced with variable frequency drives (VFDs). New VFDs will be free-standing or wall-mounted near the respective pumps.

The 500 KVA transformer at the Ranney Building also needs to be moved to be located outside the 100-year floodplain. Inside the Ranney Building, 480-volt, 3-phase power is distributed via a 3-pole, 500-amp main circuit breaker, 3-pole, 600-amp manual transfer switch, MCC with a 3-pole, 600-amp main circuit breaker, 15 KVA step-down transformer, LPA, 10 KVA step-down transformer, and lighting panelboard (LPB). The 10 KVA transformer and panelboard LPB are in the valve vault between the 1 and 2 MG Reservoirs. Full-voltage, non-reversing motor starters for Wells 12, 18, and 19 are located inside the Ranney Building. The wells are located remote from the building. Well 12 is 150 HP and controlled via a Size 5 motor starter. Well 18 is 60 HP and controlled via a Size 4 motor starter. Well 19 is 75 HP and controlled via a Size 4 motor starter. VFDs for Ranney Well Pumps 9A, 9B, and 9C are located inside the Ranney Building (near the well pump motors); each pump is 60 HP.

A 230 KW trailer-mounted, portable generator is parked in a building near the Ranney Building and connected to the manual transfer switch to provide standby power to the Ranney Building in the event of a utility power outage. The generator is likely capable of operating two Ranney Well Collector pumps. The generator needs to be manually started and connected during a power outage.

The existing main circuit breaker, manual transfer switch, motor control center, step-down transformers, panelboards, pump motor starters, and pump VFDs have exceeded or are near the end of their useful lives and should be replaced. New electrical equipment could be located in a workshop area in the Ranney Building.

2.5.4 Water Treatment Plant

The WTP is a single-stage lime softening treatment plant. Water is pumped to the WTP, which is located southwest of the City in Union Township. The WTP has a treatment capacity of 8.25 mgd. The treated water flows by gravity to 2 ground storage reservoirs on the Island. Refer to Figure 3 for a site plan.

Raw water is supplied and conveyed to the WTP via the City well system. At the WTP, water is first passed through an aeration step to strip off carbon dioxide and reduce the quantity of softening chemical needed, thereby reducing the volume of residuals produced. Softening chemicals including lime, soda ash, and ferric chloride, are added to raise the pH and to precipitate calcium and magnesium hardness. The water then flows by gravity to a set of 2 solids contact clarifiers, where flocculation, sedimentation, and clarification occur in each basin. The clarified water flows by gravity to a recarbonation tank where carbon dioxide is added to lower the pH of the water. The carbonated water is then filtered via 2 banks of dual media gravity filters with 4 filter cells each. The filters are periodically backwashed, the solids are removed, and the backwash water is routed to an onsite backwash seepage lagoon. Polyphosphate for corrosion control and sodium hypochlorite for disinfection are added to the filtered water. Fluoride is also added to the water before it flows by gravity out of the Plant to the Island. Fluoride is dosed to current standards, 0.6 – 0.7 parts per million (ppm). The City's raw water has a naturally occurring fluoride concentration of 0.3 ppm.

The unit processes at the WTP and the capacity are provided in Table 6.

Table 6 – Unit Processes and Capacity

Unit Process	Capacity
Aerator	
No. of Units	1
Air to Water Ratio	0.63 cfm/gpm
Height	33.92 ft
Down Flow Velocity	0.5 ft/s
Tray Aerator Application	20 gpm/ft^2
Capacity	8.24 mgd
Conical Clarifiers	
No. of Units	2
Major Diameter	51-ft 6-in
Minor Diameter	10-ft 6-in
Overall Height	33-ft 6 in
Volume	190,000 gal
Detention Time	66.33 min
Rated Capacity	8.25 mgd
Recarbonation	
No. of Tanks	1
Injector Capacity	173 lbs/hr
Gas to Water Ratio	2.14 ppm CO2
Tank Volume	43,000 gal
Detention Time	7.52 min
Rated Capacity	8.63 mgd
Filtration	
No. of Cells	8
Cell Surface Area	240
Loading Rate	3.0 gpm/sf
Sand Depth	12-in
Anthracite Depth	18-in
Rated Capacity	8.30 mgd

Refer to Figure 3 for the WTP site plan and Figure 4 for schematic of the existing treatment processes.

2.5.4.1 Existing Electrical System

A medium-voltage (primary) electrical service (8320-volts, 3-phase) is provided at the WTP. Power is distributed via pad-mounted medium-voltage (15 KV) primary switchgear to a 500 KVA pad-mounted transformer. The primary switchgear is located near the WTP property line at the entry drive off South Lincoln Road. The pad-mounted transformer is located immediately outside the WTP Electrical Room in the southwest corner of the building. Inside the WTP, 480-volt, 3-phase power is distributed via a main distribution panel (MDP) with 3-pole, 600-amp main circuit breaker and various feeder circuit breakers, 3-pole, 225-amp automatic transfer switch

(ATS), emergency distribution panel (EDP) with 225-amp main lugs and various feeder circuit breakers, various step-down transformers (two 45 KVA and one 30 KVA), distribution panelboard (DPA) with 100-amp lugs, lighting panelboards (LPA, LPB, and LPC), emergency lighting panelboard (ELPA) with 3-pole, 150-amp main circuit breaker, and various motor starters, disconnect switches, and VFDs. Standby power is provided to limited equipment via a 120 KW, natural gas, indoor generator (in a room next to the Electrical Room). The generator connects to the emergency side of the ATS and automatically starts on a loss of utility power. The generator shuts down and the ATS switches back to normal on restoration of utility power. It is recommended that the power distribution system be modified to accommodate a larger generator and ATS so more loads will be able to operate during a utility power outage.

2.5.4.2 Existing SCADA System

The SCADA system consists of a network of programmable logic controllers (PLCs), input/output (I/O) racks, control panels, operator interfaces, computer servers and workstations, radios, modems, and other network equipment. Components are connected via hardwiring, radio, telephone, and fiber optic connections. SCADA software runs on the computer servers and client workstations and include graphical user interfaces, historian, reporting, trending, and alarming features. Most of the existing hardware is manufactured by Opto22. Following is a general list of existing control panels and SCADA components:

- CP-F1 (Filters 1, 2, 3, 4)
- CP-F2 (Filters 5, 6, 7, 8, I/O Terminal 7)
- CP-LIME (PLC, I/O Terminal 6)
- CP-CLAR (Clarifiers 1, 2, I/O Terminal 3)
- FP-1 (Ferric Chloride)
- FP-2 (Sodium Hypochlorite)
- FP-3 (Lime)
- CP-VV (Ground Storage Tanks, Fiber Optic Connection)
- CP-HS (High Service Pumps 6, 7, 8, 9, PLC, I/O Terminal 8, Fiber Optic Connection)
- Supervisory Computers (2)
- I/O Panel 1, PLC (Control Room)
- I/O Panel 2 (Chem Feed)
- I/O Panel 4 (Clarifier Base)
- I/O Panel 5 (Lime)
- Radio Modem
- Telephone Modem
- Auto dialer
- Remote Station 2, I/O Terminal 9 (Wells 6, 15, 20, Radio Modem)
- Remote Station 3, I/O Terminal 10 (Wells 16, 17, Fiber Optic Connection)
- Remote Station 4, I/O Terminal 11 (1MG Tower, Radio Modem)
- Remote Station 5, I/O Terminal 12 (0.5 MG Tower, Fiber Optic Connection)

2.5.5 City Distribution System

The existing City water system consists of three well fields supplying a lime softening water treatment plant, two finished water storage reservoirs, a high service pump station with four pumps, and two elevated tanks. The existing distribution system has a single pressure district with 2 elevated storage tanks: the Isabella Road Elevated Tank with a volume of 1MG, and the Kinney Avenue Elevated Tank with a volume of 0.5 MG. The existing City system is shown in Figure 3.

The elevated tank operating ranges and typical pressure ranges for the City are helpful for understanding how the City system operates. The typical operating pressures and elevated tank operating ranges for the City system are shown in Table 7.

Table 7 – City Average Hydraulic Grade and Pressure Range

Pressure Zone Name	Elevated Tank Name	Average Hydraulic Grade Range	Average Pressure Range
City Main Pressure District	Kinney Street	885 – 899	41 – 65
	Isabella Road	885 – 899	

2.6 Summary of Project Need-Island

2.6.1 Ranney Well Collector

In addition to the lack of capacity in the ground water supply, the quality of water was never satisfactory. The ground water wells produce water high in iron and hydrogen sulfide content with the hardness ranging from 350 to 500 ppm. Therefore, the Ranney horizontal collector well was constructed in 1962 with the Chippewa River as its source water. Due to superior water quality and capacity Ranney Well has been the main source of water that the WTP treats and supplies to the City.

This well is a horizontal collector type well with a river recharge and is located approximately 1 mile upstream on the Chippewa River. A horizontal well consists of a central vertical well or collector from which perforated pipe is extended horizontally through natural gravel. The concrete cylindrical caisson is 13 feet in diameter and 35 feet deep. The laterals are approximately 1,283 feet of perforated 12” diameter steel pipe in multiple directions at elevation of 28 feet below the river level. The water from the aquifer percolates or flows through the gravel formation and into the perforated pipe, thence into the central caisson for pumping into treatment and distribution facilities

Since its construction in 1963, the well has been periodically upgraded and cleaned in effort to extend its production capacity for as long as possible. The collector was last rehabilitated in 2017 by mechanical cleaning and redevelopment of 6 laterals by high pressure water jet system. Because of the mineral content of the water in the area, the laterals require cleaning approximately every 5 years to maintain the well’s capacity.

The staff has noticed a (25%) decrease in production of the collector and therefore the Ranney Well Collector rehabilitation is included in the Project Planning Document for rehabilitation.

2.6.2 Island Electrical

The pad-mounted medium-voltage (15 KV) primary switchgear and 500 KVA pad-mounted transformers that serve the Ranney Well Building need to be replaced and relocated to be outside (above) the 100-year floodplain elevation. Flooding of this equipment would leave the Ranney Wells, and Wells 12, 18, and 19 out of service.

The main circuit breaker, manual transfer switch, MCC, well motor starters, Ranney Well Collector VFDs, step-down transformers, and lighting panelboards at the Ranney Well Collector Building and Valve Vault have exceeded their rated useful life expectancy and should be replaced. New electrical equipment could be installed in a workshop area in the Ranney Building.

A permanent generator and automatic transfer switch should be added to (automatically) provide standby power to the Ranney Building should a utility power failure occur. This new equipment would replace the existing trailer mounted generator and manual transfer switch. The new generator would be a diesel unit installed outside near the Ranney Building with a weather-protected enclosure and sub-base fuel storage tank sized to allow the generator to operate for a minimum of 24 hours at full load.

The City's water system relies on the Island for supply of raw water as well as storage and pumping of treated water. The proposed upgrades are necessary to increase the overall reliability of the power distribution system.

2.7 Summary of Project Need – Water Treatment Plant

2.7.1 Clarifier Valves

The clarifier influent valves 16-inch pneumatically operated are original to the plant installed in 1994 and are at the end of useful life. These valves are manual operated valves. They are the main isolation valves on the influent piping to each of the clarifiers. Due to age, they may experience operational issues, and there is risk of failure during operation. Replacement of the valves is required to maintain reliability for operation. The addition of new electric actuators that serve similar functions but allow for increased feedback to the SCADA system will allow operators better remote control and observation of these valves.

2.7.2 Filters

The WTP has 8 granular dual media filters. The filter media, air scour blower, valves, pneumatic actuators, main distribution piping are also original to the plant installed in 1994. Therefore, are at the end of their useful life. They are critical components necessary at each filter and need to be replaced.

The inlet distributer piping, existing joints and supports are showing signs of corrosion. This may be due to dissimilar metal reaction.

The granular dual media consists of a combination of sand and anthracite. The filters have 18 inches of anthracite above 12 inches of filter sand. The filter media characteristics may have changed over time. The media expands during backwashing, which can lead to media being lost as it is carried away by the backwash water. Another potential reason for filter media loss is that the media can degrade as it ages. Over time, the filter media can break down into finer particles the more times it is backwashed. If these particles become too fine, they can be carried more easily out of the filter during backwashing. Mudballs are also an issue with aged filter media, which are formed when coagulant and particles attach to filter media resulting in a mass that is difficult to remove or break up. Cracks in the media can also form over time. These issues can cause backwash non-uniformity resulting in localized high velocities that can increase the potential for loss of media. Therefore, filter media needs replacement.

There is an existing blower for air scouring of the media that is also original to the plant and at the end of its useful life.

The existing valves need to be replaced and the pneumatic actuators need to be replaced with new electric actuators that serve similar functions but allow for increased feedback to the SCADA system should be installed to allow operators better remote control and observation of the control valves. The filter piping and supports are showing signs of deterioration that needs to be addressed.

2.7.3 Recarbonation Tank and Piping

The WTP uses CO_2 for pH reduction and the system was installed in 1994. The CO_2 tank is located on site outside the WTP building. A 2-inch steel piping is routed to this tank to the bottom of the recarbonation tank, where CO_2 is injected at 4 locations. The recarbonation tank is 19-feet in diameter, 43,000 gallons coated steel construction. The recarbonation tank at the air-water interface (approximately top 6ft section) indicates signs of deterioration, coating issues and corrosion that needs to be addressed. There are 2 manually operated valves on the influent and effluent side of the tank that are at the end of their useful life and need replacement.

In addition, the CO_2 being introduced at the bottom of the recarbonation tank does not achieve proper mixing and therefore the feed point needs to be relocated. This improvement also includes some upgrades to the control panel.

2.7.4 Aeration Tower

The aeration tower is used prior to clarification for reducing volatile organic compounds. The aeration tower and the packing material is original to the plant installed in 1994, with a rated capacity of 8.24 MGD. The tower is a coated steel construction. The supply fan and the packing in the Aerator needs to be replaced due to age. While the tank is down for packing replacement, the tank will be coated on the inside.

2.7.5 Chemical Tanks

The WTP utilizes ferric chloride, fluoride, sodium hypochlorite and sodium hydroxide feed systems in the treatment process. There are 7 total tanks, fiber reinforced plastic construction, which are original to the plant. They are approaching the end of their useful life and need to be replaced. The existing piping to and from the tanks will be reused.

Table 8 – Chemical Tanks

Purpose	Quantity and capacity
Ferric Chloride	Three, 5,700 gallons
Sodium Hydroxide	Two, 10,900 gallons
Sodium Hypochlorite	Two, 7,200 gallons

2.7.6 WTP Roof

The existing roof system is composed of EPDM ballasted roof system over rigid insulation. The existing roof area is approximately 16,200 sf. It is a 45-mil thick EPDM single-ply system including protection course under pavers, neoprene flashing, splicing cement, wood nailers, gum tape, lap sealant, elastic water tape, cutoff mastic, pavers, stone ballast, pipe seals, and other prefabricated accessories. The roof is original to the plant and based on the site visit performed by Fishbeck and discussions with staff, the existing roof leaks. The area under the chemical tanks has concrete planks that will need to be replaced, after the new chemical tanks are installed. The underside of the roof in the Clarifier area is painted metal decking. The paint in this area is peeling and falling into the clarifiers, the area needs to be cleaned and repainted.

2.7.7 WTP Electrical

The following electrical equipment at the WTP are original to the plant and reaching their rated life. The equipment is critical to support the WTP equipment and needs to be replaced. As these components age, they pose the risk of failure during operation and may lead to an emergency and costly repairs or replacements.

- Pad mounted medium voltage primary switchgear
- Pad mounted transformer 500 KVA
- Main Distribution Panel (3P600A)
- Emergency Distribution Panel (3P225A)
- Distribution Panel (100A)
- (3) Step-Down Transformers
- (3) Lighting Panelboards
- Emergency Lighting Panelboard
- Variable Frequency Drives
- Motor Starters
- Disconnect Switches

The standby power source for the plant is a 120 KW natural gas generator located in a dedicated room inside the WTP building. The generator is original to the plant and was sized and connected to supply standby power to limited process equipment and emergency lighting. The existing generator and automatic transfer switch need to be replaced by larger units that can provide standby power to all the treatment equipment at the plant during power outages. This project will help ensure that the WTP remains reliable and operational during power related emergencies (outages).

2.7.8 HVAC System

The boilers provide heat via the Heating, Ventilation and Air Conditioning (HVAC) system. There are 2 boilers and a central dehumidifier system at the WTP that are original to the plant constructed in early 1990s.There are 3 Air Handling Units (AHU) to regulate and circulate air as part of a heating, ventilating, and air-conditioning (HVAC) system. The boilers are natural gas fired units. The boilers, AHUs and the dehumidifier are approaching the end of their useful life. The plant staff indicated that the dehumidification system is operating with aged equipment and also poses the risk of equipment failure. The aging equipment requires frequent maintenance and is becoming less efficient with spare parts difficult to find. Therefore, the 2 boilers and dehumidifier need to be replaced. The central dehumidifier does not function properly and needs to be replaced with smaller portable efficient units.

Table 9 – Air Handling Unit Schedule

						Motor Spec	
Tag No.	Size	CFM	TSP IN. W.G.	O.A. CFM	RPM	HP	Voltage
AHU-1	10	4000	3.6	1765	1412	5.0	460/3
AHU-2	C42	6000	2.0	6000	-	5.0	460/3
AHU-3	022	7800	0.2	0	-	(2) 3/4	460/3
B-1, B-2	Hot water heating boiler. Min. 1.094 MBH output, Min. 79.9 percent efficiency on natural gas, 95 GPM from 160 degrees Fahrenheit to 182 degrees Fahrenheit.						
DH-1	Desiccant humidifier, 7500 CFM process airflow rated at 155 lbs/hr based on 75000 CFM air at 70 degrees Fahrenheit DB, 66 GR/lb direct-fired natural gas regeneration at 2700 CFM.						

2.7.9 SCADA System

The SCADA system allows plant operators to centrally monitor and control WTP operations for systems at the WTP and remote facilities. Existing Opto22 PLCs and I/O modules are becoming obsolete and should be replaced with more readily available and supported (mainstream) hardware. Allen-Bradley Logix equipment is recommended. It is also recommended that the existing SCADA software be upgraded to VTScada or a similar product that will include better graphics, trending, alarming, reporting, data archiving, historization, and remote access via a virtual private network connection. Computer servers, client workstations, and associated peripherals will also be upgraded. Managed ethernet switches will be provided for enhanced security and to prevent unauthorized network access. Existing radios and telephone equipment will be replaced with cellular equipment. Fiber optic connections will be maintained and added where feasible. Existing control panel enclosures will be reused. New hardware will be mounted on new backplates so existing terminals blocks and field wiring can be reused. New uninterruptible power supplies (UPSs) will be provided for increased power quality and reliability. Existing field devices, instrumentation, and controls will be reused where possible.

2.8 Summary of Project Need – Raw Water Reservoir and Low Lift Pump Station

The raw water from wells and the Ranney Well Collector is conveyed to the WTP for treatment daily. The plant is dependent on the water conveyed for production. This method of conveyance and production works, however it does not provide the plant staff any operational flexibility. In addition, the Island site is remote, and any equipment failure could result in no raw water to the plant. This could affect the water system reliability. Therefore, provisions need to be made to store raw water on the WTP site. Due to the difference in hydraulic grade line elevations between the reservoir and the Aerator, intermediate pump station will be required.

2.9 Summary of Project Need – Finished Water Reservoirs and High Service Pump Station

The existing finished water reservoirs (1MG and 2MG) and the high service pump station are located at the Island. There are four high service pumps. The reservoir (1 MG) needs rehabilitation based on the inspection performed in January 2022. The high service pumps and station are located on the outer ring of the reservoir. The high service pump motors and the electrical equipment are aged and in need of replacement. In addition, the Island is in the floodway and at a remote location. Therefore, instead of rehabilitation of the existing finished water infrastructure at the Island, new finished water infrastructure is being proposed at the WTP site.

2.10 Summary of Project Need – Lime Sludge Improvements

Lime is used at the plant for water softening. Lime is introduced at the clarifiers. The lime sludge generated is stored in the sludge ponds No.1 and No.2 for settling while the water is decanted. This stored lime sludge removal and hauling service is contracted annually. This is an additional operation and maintenance cost each year to the City's water budget. Over the years, there has been also a noticeable increase in these costs. Therefore, the method of lime sludge removal and disposal has been evaluated into 3 different alternatives.

2.11 Summary of Project Need – Distribution System

2.11.1 Water Meter

The water meters throughout the distribution system need to be replaced due to the age and technology being obsolete. The readings are collected by a meter reader. There are currently 5 different models of water meter in the system, current issues include higher rate of failure, more required training, and more difficult maintenance in general. In accordance with the City's water meter replacement program that began in 1998, water meters that meet usage (total gallons registered) and age (years of service) criteria are replaced to ensure accuracy and proper operation. The city previously completed an analysis of switching to Advanced Metering Infrastructure (AMI).

AMI fully automates meter reading, billing, and data collection processes. AMI will help ensure correct and timely billing and, in some cases, reduce time spent reading meters. This replacement will ensure proper revenue collection through meter accuracy, and thus it is a continuous and required process. It will also provide improved system reliability and future operational efficiencies.

2.11.2 Distribution System Valves

The Mt. Pleasant water system has been in place since the early 1900s, and the valves provide the key function of isolating segments within the system for construction, isolation, or emergency repairs. Old, deteriorated, and inoperable valves will need to be replaced as they age. This project will replace valves in the distribution system, add valves in critical areas, and ensure that the water system remains reliable. The valve replacements or additions will be strategically planned water main work, road construction projects, in addition to general system valve replacements.

2.11.3 Emergency Connection with Union Township

The City has its critical water supply and distribution assets on the Island. The City owns and operates these assets to supply water to its customers. In case there are any issues with these assets, the City's water system will lose pressure and will need to issue a boiled water advisory. In addition, the City will not be able to serve its customers end of the stored water in the elevated tanks. Therefore, an interconnection with Union Township is included in the Project Planning Document in the event of an emergency. Due to the hydraulic grade lines, water can only be supplied from Union Township to the City to maintain minimum pressure.

2.11.4 Portable Generator for Broomfield Well Field

The Broomfield Well Field utilizes a 100 KW portable generator as a standby power source for Wells 6, 15, and 20. The existing generator is approaching the end of its useful life and should be replaced.

2.11.5 Lead Service Line Replacements (LSLR)

Lead water services are a known potential public health hazard. It is expected that lead services still exist within older portions of the distribution system. These lead services must be eliminated within the next 20 years to meet the requirements of the Safe Drinking Water Act. The City is planning on investigating water service lines in summer of 2023.

Approximately 25 lead services have been included for replacement within this Project Planning Document.

3.0 Analysis of Alternatives

The alternatives were evaluated using the following project objectives:

- Replacement of lead service lines to comply with Safe Drinking Water Act.
- Replacement of water meters, valves throughout the distribution system for system reliability.
- Optimize the existing system where possible to mitigate issues.
- Replace aged equipment to provide reliable water treatment and safe drinking water to system users.
- Utilize existing equipment locations and space available where possible.
- Utilize primary source of water from the Ranney Collector which is much less expensive to treat at the WTP.
- Provide safe and adequate supply of drinking water to all of the residents of the City.
- Minimize financial burden to water system users.
- Maintain plant operations during construction.
- Minimize environmental impact during construction.

3.1 Ranney Well Collector

3.1.1 No Action

The Ranney Well Collector is the principal source of water for the City's water system. In this alternative the Ranney Well Collector will continue to operate, and the capacity of the well would continue to decrease over time. This would increase the City's dependency on the ground water as a primary source and increased expense for water softening.

Therefore, the no-action alternative will not be considered further.

3.1.2 Optimum Performance of Existing Facilities

The relatively high capacity of the Ranney Well is achieved because of the long length of lateral collectors, which act as screens to collect and transmit groundwater to the central caisson. However, over time the laterals require cleaning due to the deposits of mineral content in the water. This alternative includes rehabilitation of the existing laterals via cleaning. In the past cleaning cycles, the City has experienced significant sections of the laterals collapse, leading to removal from service. Therefore, this alternative also includes adding up to 3 new high-capacity laterals. These new laterals can provide the needed capacity to restore the productivity of the well in case of existing lateral collapse. Rehabilitating and addition of new laterals can provide the water required by the community at a lower capital cost than typical vertical wells providing equivalent capacity. In addition, the water from the Ranney Well can be treated by the City's water softening plant much less expensively than the harder water that is produced by the vertical wells.

There is savings to that regard in terms of treatment. This also will assure a safe and adequate supply of drinking water to all the residents of the City at affordable rates. A reliable, high-quality, low-cost water supply is a very important element for economic development in the community.

Therefore, this alternative will be further evaluated as a principal alternative.

3.1.3 Construction Alternative

In this alternative a new horizontal well collector system will be constructed to replace the Ranney Well Collector. There is not adequate space on the Island for this alternative and it is financially not feasible. Therefore, this alternative will not be evaluated further.

3.1.4 Regional Alternative

A regional alternative is not applicable.

3.2 Island Electrical

3.2.1 No Action

The Ranney Well pump motors, VFDs, MCC would continue to function without replacement. This could lead to various failures due to the age of the electrical equipment. Older equipment will likely need frequent maintenance. Also, spare parts might become less available in the future. In addition, the HSPs will operate without VFDs at constant speeds. The trailer mounted generator will need to be manually operated and connected during power outages; it is also undersized. The pad mounted transformers and primary switch for the Ranney Well building are barely above the 100-year flood elevation. They could get submerged which would significantly impact operation of the critical equipment on the Island. Therefore, no further consideration is given to this alternative.

3.2.2 Optimum Performance of Existing Facilities

The existing electrical equipment at Ranney buildings (e.g., well pump motors, VFDs, motor starters, MCC, transformers, and panelboards) will be replaced. The Ranney building transformers and associated primary switch will be relocated to higher elevations. The trailer mounted generator will be replaced with a permanent generator and automatic transfer switch added to the building's power distribution system. The Valve Vault step down transformer and lighting panel will be replaced.

This alternative will be further evaluated as a selected alternative.

3.2.3 Construction Alternative

This alternative includes installing new electrical equipment in a new building and the rerouting of electrical cables and duct banks. Given the scope of improvements, it was determined not to be viable spatially or financially. Therefore, it is not considered a principal alternative and will not be evaluated further.

3.2.4 Regional Alternative

A regional alternative is not applicable.

3.3 Water Treatment Plant Improvements

3.3.1 No Action

If the no action alternative were to be selected, the WTP would lack the needed asset replacements to maintain system reliability. The existing systems will age and could continue to operate for a time, but the longer these improvements are not completed, the risk of failure continues to increase. In addition, the lack of spare parts and maintenance of aging equipment could pose a challenge. The systems prioritized for replacement have limited or no redundancy, so failure will have significant operational impacts.

Therefore, this alternative has been eliminated from further consideration.

3.3.2 Optimum Performance of Existing Facilities

This alternative evaluates the optimization of the WTP by making improvements to the following:

3.3.2.1 Clarifier Valves

The manually operated clarifier valves 20-inch on the influent line will be replaced with new electrically actuated valves. This replacement will be integrated into SCADA for operation and control of the valves.

3.3.2.2 Filter Improvements

The filter media will be replaced with new dual media consisting of anthracite and sand, meeting 10 state standards. There are filter cell inlet valves, backwash waste valves, filtered water valves and filter-to-waste valves. These filter valves -including pneumatic actuators will be replaced with new valves and electric actuators. Actuator replacements will be integrated into SCADA for operation and control. The steel inlet distributor piping and supports will be replaced.

3.3.2.3 Recarbonation Tank and Piping

The recarbonation tank will be rehabilitated by removal of the deteriorated steel portion and welding on a new steel tank portion. The tank will be recoated in the interior. The 24-inch manually operated valves on the influent and effluent side of the tank will be replaced. The recarbonation tank will be demolished from the output side of the control panel to the lower floor where the CO2 is injected at multiple locations. There will be new, steel CO2 piping from the control panel to the new injection point closer to the Aerator.

3.3.2.4 Aeration Tower

The packing within the tower will be replaced and the interior of the Aerator cleaned and coated. The supply fan for the Aerator unit will also be replaced.

3.3.2.5 Chemical Tanks

All the chemical bulk tanks will be replaced with similar material and capacity. The chemical feed piping and vent piping will be temporarily removed and replaced.

3.3.2.6 WTP Roof

The existing roof will be replaced in its entirety with a new roofing system including elastomeric roofing membrane, adhered with a conventional application, insulation, cover boards, roofing stack boots, and walkway pads. The underside of the roof by the clarifiers will be cleaned and coated. The concrete planks under the roof by the chemical tanks will be replaced.

3.3.2.7 WTP Electrical

The critical WTP equipment noted in section 2.7.7 will be replaced due to age. The WTP generator will be replaced with a larger generator that can provide standby power to all critical treatment processes to keep the plant fully functional. The new generator would be a diesel unit installed outside near the Electrical Room with a weather-protected enclosure and sub-base fuel storage tank sized to allow the generator to operate for a minimum of 24 hours at full load.

3.3.2.8 HVAC System

The boilers air handling units will be replaced with a unit of similar capacity. The central dehumidifier will be replaced with smaller capacity/portable units in strategic locations.

3.3.2.9 SCADA System

The SCADA system will be replaced to a more widely used and supported manufacturer. The existing PLC cabinet should be replaced with a new, properly sized cabinet, including a panel mounted operator interface terminal.

3.3.3 Construction Alternative

Given the scope of the project need, the construction alternative does not apply with the WTP improvements. There is existing equipment and systems in place within the WTP building envelope which is not changing.

3.3.4 Regional Alternative

A regional alternative is not applicable for the any of the WTP improvements. Therefore, no further consideration will be given to this alternative for any of the WTP improvements.

3.4 Raw Water Reservoir and Low Lift Pump Station

3.4.1 No Action

The existing system of supplying raw water from the Island to the WTP will continue. Therefore, not providing any operational flexibility and storage of raw water on the WTP site. With the Island being remote, there could be issues with the Island equipment. In which case, affects the raw water supply to the WTP. Therefore, decreasing the water system reliability. Due to these reasons this alternative will not be developed further.

3.4.2 Optimum Performance of Existing Facilities

The existing raw water system on the Island cannot be optimized by addition of a raw water tank. There is no available space, and it would not resolve the issues associated with the remote location. Therefore, this alternative is eliminated.

3.4.3 Construction Alternative

In this alternative, new raw water reservoir will be constructed at the WTP site. The size of the reservoir will be further evaluated during design. The size of the reservoir will be sufficient to handle the maximum day demands. A connection will be made at the 24-inch raw watermain to divert water to the reservoir. Mixer will be installed in the reservoir to continuously mix the contents of the reservoir. Isolation valves in the vault and at strategic locations of yard piping will be provided. This will allow for a bypass around the reservoirs if needed. Due to the difference in the grade line between the reservoir and the Aerator, a Low Lift Pump station will be needed. The station building will house pipe gallery, pumping equipment, appurtenances, and electrical equipment.

Primary power will be provided via the plant’s existing medium-voltage primary service. Power (480-volts, 3-phse) will be distributed inside the Low Lift Pump Station via a new motor control center, automatic transfer switch, variable frequency drives, step-down transformer, and lighting panelboard. An outdoor generator with weather-protected enclosure and sub-base fuel tank sized to allow the generator to operate at full load for a minimum of 24 hours will supply standby power in case of a utility power failure.

3.4.4 Regional Alternative

A regional alternative is not applicable.

3.5 Finished Water Reservoirs and High Service Pump Station

3.5.1 No Action

The no-action alternative the finished water reservoirs and the high service pump station will continue to be on the Island. The existing 1.0 MG ground storage reservoir would need to be rehabilitated. In addition, the wet well for the existing high service pump station is too small for the existing pump configuration. Water facilities on the Island struggle with high groundwater levels and flooding. Therefore, this option will not be not evaluated further.

3.5.2 Optimum Performance of Existing Facilities

In this alternative the reservoirs and the high service pumps will be rehabilitated. However, they will continue to be on the Island. Water facilities on the Island struggle with high groundwater levels and flooding. Therefore, this option is not evaluated further.

3.5.3 Construction Alternative

Due to the difficulties with the Island site, new finished water reservoirs and high service pump station will be constructed on the WTP site. A new transmission main will be installed to connect the water system. Therefore, all the finished water infrastructure will be located at the WTP site and out of the floodway.

Two reservoirs, similar to the existing capacity, will be constructed. The size of the reservoir will be sufficient to handle the maximum day demands and be redundant. A high service pump station with 4 similar capacity pumps. A connection will be made at the 24-inch finished watermain to divert water to the reservoirs. Mixers will be installed in the reservoir to continuously mix the contents. Isolation valves in the vault and at strategic locations of yard piping will be provided. This will allow for a bypass around the reservoirs if needed. The station building will house the pipe gallery, pumping equipment, appurtenances, and electrical equipment.

This would be the first step to moving all the finished water storage and high service pumping to the Plant site, which will ease operation and maintenance of these facilities and eliminate the issues present at the Island site. The existing finished water reservoirs and equipment at the Island will be phased out, disconnected, and abandoned appropriately.

A transmission main will connect the finished water piping from the WTP to the nearest transmission main in the distribution system.

3.5.4 Regional Alternative

The regional alternative is not applicable.

3.6 Lime Sludge Improvements

3.6.1 No Action

The no-action alternative the WTP will continue to convey the lime sludge to the lagoons. On an average it is about 1,200,000 gallons of lime sludge of ~3% solids per year. The sludge will be annually contracted for excavation, hauling and disposal. The contractor provides necessary labor and equipment. However, this is an added operation and maintenance expense every year that could be directed towards other WTP improvements. In addition, the City is dependent on the Contactor and his schedule completing the activity.

Therefore, this option is not evaluated further.

3.6.2 Optimum Performance of Existing Facilities

-The optimization of existing facilities includes purchasing of all the equipment necessary for performing sludge removal and disposal by City staff. The lime sludge operations are short term on an annual basis. Therefore, City intends to have dedicated staff attending to this activity. The alternative offers return on investment by savings achieved over the annual contracted services alternative. Since the activity is managed by City staff, there will be more control process overall.

This alternative will be considered further.

3.6.3 Construction Alternative

This alternative will include a lime sludge dewatering process by a mechanical dewatering equipment. A separate dewatering building will be constructed that will house the equipment and appurtenances for a fully functional dewatering system. This process will dewater the lime sludge from ~3% solids to ~20% solids. The dewatering equipment will be operated daily. The dewatered solids will be collected in a roll-off dumpster and disposed of at a landfill. This alternative involves hauling costs.

3.6.4 Regional Alternative

The regional alternative is not applicable.

3.7 Water Meter Replacement

3.7.1 No Action

This alternative is not considered because the aging water meters will not ensure that the water system customers are getting billed the proper amount for their water use.

3.7.2 Optimum Performance of Existing Facilities

-Not replacing the existing technology and rather optimizing the older meters' performance is a temporary and ineffective solution. There are 5 different models of water meter which increases the rate of failure, more difficult to maintain, requires more training, and replacement parts are harder to find. This is not considered as an alternative for the water meters.

3.7.3 Construction Alternative – New Water Meters

Replacing the water meters throughout the system with Advanced Metering Infrastructure (AMI) would provide the city with more accurate readings and reduce time spent reading meters, which would increase cost-effectiveness. AMI is also a surveillance component because it generates data and alerts that may indicate system contamination or tampering. The 5 models of meter within the system will be replaced with one uniform model which will lessen the issues listed in section 3.1.2. The meters would be replaced during the period of 2022-2027 per the meter rotation plan. Replacement will ensure proper revenue collection through meter accuracy. In addition, help ensure correct and timely billing and, in some cases, reduce time spent reading meters.

This alternative is evaluated further as a principal alternative.

3.7.4 Regional Alternative

A regional alternative is not applicable for the replacement of the water meters. The source of the water does not change that fact that the water meters are outdated and need to be replaced with more accurate and cost-effective technology. This alternative is not considered further.

3.8 Distribution System Valves

3.8.1 No Action

This alternative is not considered because with aging valves in the water distribution system there is a higher likelihood of them failing in the event of an emergency repair or construction. The valves in the distribution system will be replaced to improve the reliability of the system.

3.8.2 Optimum Performance of Existing Facilities

The replacement of valves within a water distribution system is an essential maintenance practice. Valves must be replaced periodically to assure reliability within the system. Therefore, this alternative is not further pursued.

3.8.3 Construction Alternative – New Distribution System Valves

Valves need replacing as they deteriorate with age and become inoperable. With this distribution system having been in service the early 1900s it is crucial to the overall reliability of the system that the valves get replaced so that they can isolate areas in the case of emergency repair. This alternative is evaluated further for the principal alternative for the distribution system valves.

3.8.4 Regional Alternative

This alternative is not applicable to the valves in the water distribution system. This alternative is not given further consideration.

3.9 Emergency Connection with Union Township

3.9.1 No Action

The City is capable of pumping disinfected ground water from a couple of wells. In the No-action alternative the City will continue to use these wells, disinfect, and supply water. However, this water supplied is not fully treated and will not provide sufficient water to keep up the minimal water system pressures.

Therefore, this alternative will not be evaluated further.

3.9.2 Optimum Performance of Existing Facilities

The existing system consisting of disinfection capabilities wells cannot be optimized further. Therefore, this alternative will not be evaluated further.

3.9.3 Construction Alternative – Connection with Union Township

The construction alternative includes a physical connection with Union Township. The Township is in close proximity to the City. It works on a higher-grade line than the City and will work in favor of the emergency connection. An emergency connection will consist of a concrete vault with piping, meters, and valves.

3.9.4 Regional Alternative

This alternative is not applicable.

3.10 Portable Generator for Broomfield Well Field

3.10.1 No Action

Use of the existing portable generator as a standby power source would continue. The reliability of the existing generator is suspect and there is a high probability of failure; maintenance is challenging, and parts are difficult to obtain.

This alternative will not be evaluated further.

3.10.2 Optimum Performance of Existing Facilities

The existing portable generator will be replaced with a newer model of similar capacity (100 KW). This alternative will increase the reliability of the standby power during power outages. Therefore, this alternative will be considered.

3.10.3 Construction Alternative – New Permanent Generator

This construction alternative would include installation of a permanent generator along with modifications to the power distribution system to include an automatic transfer switch at the Broomfield Well Field site. Installing a permanent generator would take away the flexibility that the portable generator provides operators to be able to use the generator at different locations.

3.10.4 Regional Alternative

This alternative is not applicable.

3.11 LSLR

3.11.1 No Action

If no action is taken, existing lead services in the water distribution system will remain in place. The lead services need to be replaced to comply with the Safe Drinking Water Act.

3.11.2 Optimum Performance of Existing Facilities

Optimization is not a realistic alternative to lead service line replacement. Lead service lines are not acceptable materials any longer; there is no way to improve their performance. Therefore, performance optimization is not a viable alternative and will not be considered further.

3.11.3 Construction Alternative – New Service Lines

This alternative includes replacement of the lead or galvanized services to comply with the Safe Drinking Water Act. Approximately 25 such replacements will be made in the system.

3.11.4 Regional Alternative

A regional alternative is not applicable for lead service line replacement since the service line replacements are required to comply with the Safe Drinking Water Act.

3.12 Compliance with Drinking Water Standards

The Sanitary Survey completed by EGLE in 2020 evaluated the water system to determine if requirements of the Michigan Safe Drinking Water Act, Part 399 are being met. The evaluation determined the distribution system, and the WTP comply, although there were recommendations for improvements. Most of the items noted in the sanitary survey have been completed.

3.13 Orders or Enforcement Actions

No court or enforcement orders, or written enforcement actions have been issued to the City regarding the water system.

3.14 Drinking Water Quality Problems

The most recently published Water Quality Report (2021) indicates water quality in the City is good and contaminant levels met state drinking water standards. There are no known drinking water problems in the distribution system.

3.15 Projected Needs for the Next 20 Years

The City completed a reliability study in 2022, most of the proposed improvements are based on the recommendations in the study. The recommended improvements at the WTP and the Island are needed to address aging equipment, providing reliable treatment, and continue to supply safe drinking water to system users. The improvements in the distribution system are needed to replace aged assets and system reliability. As indicated in Section 2.4 both the City’s population and average water use have remained consistent over the last ten years. The population projections were reviewed for the service area. Significant growth within the service area is not anticipated at this time. Therefore, no expansion of the existing WTP or its unit processes will be needed for the 20-year planning period.

The proposed improvements included in this Project Planning Document involve critical equipment that is necessary to provide reliable treatment in the service area.

4.0 Principal Alternatives

4.1 Island Improvements

4.1.1 Monetary Evaluation

A monetary analysis was completed for the Island optimum performance alternatives. The Island Improvements project budget costs are presented in Table 10. These costs are preliminary estimates and will be further refined during the project design phase. Table 10 indicates the total estimated project budget cost for the Island Improvements is $4,760,000.

Table 10 – Estimated Project Cost Summary

Project	Initial Capital Cost	Design Life (years)	Salvage Value
Ranney Well Collector	$1,990,000	50	$1,200,000
Ranney Well Building & Valve Vault Electrical	$833,000	30	$300,000
Ranney Well Pump Motor Replacements	$54,000	30	$20,000
Subtotal: Estimated Capital Cost	$2,927,000		$1,520,000
Contractor General Conditions, Overhead and Profit	$440,000		
Contingency	$590,000		
Administration and Engineering	$800,000		
Total: Estimated Project Budget	$4,760,000		

4.1.2 Present Worth Analysis

A present worth analysis was completed for the Island Improvements optimum performance alternative as summarized in Table 11 and detailed in Appendix 1. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 11 – Island Improvements – Present Worth Analysis

	Island Improvements		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$4,760,000	$4,760,000	$0	$0
O&M Cost/Year	$2,000	$40,000	$50,000	$960,000
Salvage Value	$1,520,000	($1,410,000)	$0	$0
Total Worth		$3,390,000		$960,000

4.1.3 Environmental Evaluation

4.1.3.1 Cultural Resources

The proposed improvements on the Island will occur in within the limits of the property. The proposed projects have no direct expected historical or archeological impacts. The historical sites within the City are summarized in an excerpt from the National Register of Historic Places in Appendix 1.

4.1.3.2 The Natural Environment

Most of the work for the Island project would occur inside existing buildings. The Ranney Collector work related to the laterals occurring outside of the buildings, still on the Island site. The only anticipated impact to the natural environment will be short term impact due to construction.

4.1.4 Mitigation

Mitigation of environmental impacts will include best construction practices such as soil erosion prevention techniques, maintenance of construction equipment, and limiting construction to regular working hours during the week.

4.1.5 Implementability and Public Participation

The Project Planning Document will be available for public review. If at that time it becomes apparent that an alternative is not acceptable to the public, the alternatives will be reevaluated. Implementability of the project was evaluated. The proposed improvements will eliminate existing issues. The project does not require intermunicipal agreements.

4.1.6 Technical Considerations

The project would be designed to meet regulatory standards and would require approval and proper permitting from the State in accordance with Act 399. Overall reliability is improved with and new equipment because the risk of failure is reduced.

4.1.7 Residuals

This is not applicable to the Island projects.

4.1.8 Industrial/Commercial/Institutional

The City currently serves industrial customers; however, there is no significant industrial growth anticipated within the service area. There are no other large users expected or industrial use in the City water system.

4.1.9 Growth Capacity

The Island improvement projects accounted the 20-year planning period and maintaining the existing pumping capacity.

4.1.10 Contamination

There are no known contaminants on the Island. Map 3 includes the contamination map.

4.2 WTP Improvements

4.2.1 Monetary Evaluation

A monetary analysis was completed for the WTP Improvements optimum performance alternative. The WTP Improvements project budget costs are presented in Table 12. These costs are preliminary estimates and will be further refined during the project design phase. Table 12 indicates the total estimated project budget cost for the WTP Improvements is $10,780,000.

Table 12 – Estimated Project Cost Summary

Project	Initial Capital Cost	Design Life (years)	Salvage Value
Clarifier Valves	$54,000	25	$11,000
Filter Improvements	$843,000	25	$169,000
Recarbonation Tank Improvements	$122,000	25	$25,000
Aerator Improvements	$2,053,000	25	$411,000
WTP Roof Improvements	$495,000	30	$165,000
Chemical Tank Replacement	$615,000	25	$123,000
WTP Electrical Improvements	$830,000	30	$277,000
HVAC – Boilers, Dehumidifiers, Air Handling Units	$383,000	25	$77,000
Process Flow Meter Replacements	$156,000	20	$0
SCADA Upgrades	$1,100,000	25	$220,000
Subtotal: Estimated Capital Cost	$6,651,000		$1,478,000
Contractor General Conditions, Overhead and Profit	$998,000		
Contingency	$1,331,000		
Administration and Engineering	$1,980,000		
Total: Estimated Project Budget	$10,780,000		

4.2.2 Present Worth Analysis

A present worth analysis was completed for the optimum performance alternative as summarized in Table 13 and detailed in Appendix 1. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 13 – Present Worth Analysis

	WTP Improvements		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$10,780,000	$10,780,000	$0	$0
O&M Cost/Year	$160,000	$3,069,500	$500,000	$9,592,000
Salvage Value	$1,478,000	($1,370,000)	$0	$0
Total Worth		$12,480,000		$9,590,000

4.2.3 Environmental Evaluation

4.2.3.1 Cultural Resources

The proposed WTP improvement projects are on an existing site and in a developed area and no direct historical or archeological impact is expected. There are no historical sites in the vicinity of the projects.

4.2.3.2 The Natural Environment

Most of the work for the WTP projects would occur inside existing buildings at the WTP property. There will be some work occurring outside of the building, still on the WTP site. The only anticipated impact to the natural environment is a temporary decrease in air quality due to construction.

4.2.4 Mitigation

Mitigation of environmental impacts will include best construction practices such as soil erosion prevention techniques, maintenance of construction equipment, and limiting construction to regular working hours during the week.

4.2.5 Implementability and Public Participation

The Project Planning Document will be available for public review. If at that time it becomes apparent that an alternative is not acceptable to the public, the alternatives will be reevaluated. Implementability of the project was evaluated. The proposed improvements will eliminate existing issues. The project does not require intermunicipal agreements.

4.2.6 Technical Considerations

The project would be designed to meet regulatory standards and would require approval and proper permitting from the State in accordance with Act 399. With the proposed improvements, the WTP will be able to maintain compliance with water quality standards in the long term.

Overall reliability is improved with upgraded processes and new equipment because the risk of failure is reduced.

4.2.7 Residuals

There will be no change in the amount of residuals due to this project. The volume of residuals generated correlates to the amount of water produced to meet the demand. Because demand projections are not anticipated to increase significantly, no significant impact is expected on residual production.

4.2.8 Industrial/Commercial/Institutional

There is no major growth expected in the area. However, the proposed improvements to the LMFP are designed to accommodate the projected 2043 demand.

4.2.9 Growth Capacity

Each of the proposed improvements to the WTP consider the projected 2043 demand for water production.

4.2.10 Contamination

There is no known contamination at the project site.

4.3 Raw Water Reservoir and Low Lift Pump Station

4.3.1 Monetary Evaluation

A monetary analysis was completed for the Raw Water Storage Tank and low lift pump station construction alternative. The Raw Water Storage Tank project budget cost is presented in Table 14. These costs are preliminary estimates and will be further refined during the project design phase. Table 14 indicates the total estimated project budget cost for the Raw Water Storage Tank is $5,190,000.

Table 14 – Estimated Project Cost Summary

Project	Initial Capital Cost	Design Life (years)	Salvage Value
Site Work	$50,000	-	$0
Yard Piping and Valves	$132,000	50	$80,000
Pump Station Structure	$130,000	100	$104,000
Pump Station Process Equipment	$510,000	25	$102,000
Reservoir with Mixers	$1,840,000	50	$1,104,000
Reservoir Piping	$25,000	50	$15,000
Mechanical	$96,000	30	$32,000
Electrical	$400,000	30	$134,000
Instrumentation	$15,000	20	$0
Subtotal: Estimated Capital Cost	$3,198,000		$1,571,000
Contractor General Conditions, Overhead and Profit	$480,000		
Contingency	$640,000		
Administration and Engineering	$870,000		
Total Estimated Project Budget	$5,190,000		

4.3.2 Present Worth Analysis

A present worth analysis was completed for the construction alternative as summarized in Table 15 and detailed in Appendix 1. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 15 – Present Worth Analysis

	Raw Water Storage Tank		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$5,190,000	$5,190,000	$0	$0
O&M Cost/Year	$10,000	$191,800		$0
Salvage Value	$1,571,000	($1,460,000)	$0	$0
Total Worth		$3,920,000		$0

4.3.3 Environmental Evaluation

4.3.3.1 <u>Cultural Resources</u>

The proposed improvements for the raw water storage and low lift pump station will occur in the limits of the WTP property. The proposed projects have no direct expected historical or archeological impacts. The historical sites within the City are summarized in an excerpt from the National Register of Historic Places in Appendix 1.

4.3.3.2 <u>The Natural Environment</u>

There will be work associated with the construction of the reservoir and pump station. The only anticipated impact to the natural environment will be short term impact due to construction.

4.3.4 Mitigation

Mitigation of environmental impacts will include best construction practices such as soil erosion prevention techniques, maintenance of construction equipment, and limiting construction to regular working hours during the week.

4.3.5 Implementability and Public Participation

The Project Planning Document will be available for public review. If at that time it becomes apparent that an alternative is not acceptable to the public, the alternatives will be reevaluated. Implementability of the project was evaluated. The proposed improvements will eliminate existing issues. The project does not require intermunicipal agreements.

4.3.6 Technical Considerations

The project would be designed to meet regulatory standards and would require approval and proper permitting from the State in accordance with Act 399. Overall water system reliability is improved with new reservoir and pump station equipment because the risk of failure due to issues with the water supply from the Island is reduced.

4.3.7 Residuals

This is not applicable to the Island projects.

4.3.8 Industrial/Commercial/Institutional

The City currently serves industrial customers; however, there is no significant industrial growth anticipated within the service area. There are no other large users expected or industrial use in the City water system.

4.3.9 Growth Capacity

The Island improvement projects accounted the 20-year planning period and maintaining the existing pumping capacity.

4.3.10 Contamination

There are no known contaminants on the site.

4.4 Finished Water Reservoirs and High Service Pump Station

4.4.1 Monetary Evaluation

A monetary analysis was completed for the finished water reservoirs and high service pump station construction alternative. The project budget cost is presented in Table 16. These costs are preliminary estimates and will be further refined during the project design phase. Table 16 indicates the total estimated project budget cost for the finished water reservoirs and the pump station is $9,080,000.

Table 16 – Estimated Project Cost Summary

Project	Initial Capital Cost	Design Life (years)	Salvage Value
Site Work	$50,000	-	$0
Yard Piping and Valves	$132,000	50	$80,000
Pump Station Structure	$300,000	100	$240,000
Pump Station Process Equipment (Including piping, valves and flowmeter)	$1,300,000	25	$260,000
Reservoirs with Mixers	$2,489,000	50	$1,494,000
Reservoir Piping	$90,000	50	$54,000
HSP Distribution Transmission Main	$450,000	30	$80,000
Mechanical	$240,000	30	$167,000
Electrical	$500,000	30	$0
Instrumentation	$48,000	20	$0
Subtotal: Estimated Capital Cost	$5,599,000		$2,645,000
Contractor General Conditions, Overhead and Profit	$840,000		
Contingency	$1,120,000		
Administration and Engineering	$1,520,000		
Total: Estimated Project Budget	$9,080,000		

4.4.2 *Present Worth Analysis*

A present worth analysis was completed for the construction alternative as summarized in Table 17 and detailed in Appendix 1. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 17 – Present Worth Analysis

	Finished Water Reservoirs and High Service Pump Station		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$9,080,000	$9,080,000	$0	$0
O&M Cost/Year	$10,000	$191,800		$0
Salvage Value	$2,645,000	($2,450,000)	$0	$0
Total Worth		$6,820,000		$0

4.4.3 *Environmental Evaluation*

4.4.3.1 <u>Cultural Resources</u>

The proposed improvements for the finished water reservoirs and high service pump station will occur in the limits of the WTP property. The proposed projects have no direct expected historical or archeological impacts. The historical sites within the City are summarized in an excerpt from the National Register of Historic Places in Appendix 1.

4.4.3.2 <u>The Natural Environment</u>

There will be work associated with the construction of the reservoir and pump station. The only anticipated impact to the natural environment will be short term impact due to construction.

4.4.4 Mitigation

Mitigation of environmental impacts will include best construction practices such as soil erosion prevention techniques, maintenance of construction equipment, and limiting construction to regular working hours during the week.

4.4.5 Implementability and Public Participation

The Project Planning Document will be available for public review. If at that time it becomes apparent that an alternative is not acceptable to the public, the alternatives will be reevaluated. Implementability of the project was evaluated. The proposed improvements will eliminate existing issues. The project does not require intermunicipal agreements.

4.4.6 Technical Considerations

The project would be designed to meet regulatory standards and would require approval and proper permitting from the State in accordance with Act 399. Overall water system reliability is improved with new reservoirs and pump station equipment because the risk of failure due to issues with the water supply from the Island is reduced.

4.4.7 Residuals

This is not applicable to the Island projects.

4.4.8 Industrial/Commercial/Institutional

The City currently serves industrial customers; however, there is no significant industrial growth anticipated within the service area. There are no other large users expected or industrial use in the City water system.

4.4.9 Growth Capacity

The Island improvement projects accounted the 20-year planning period and maintaining the existing pumping capacity.

4.4.10 Contamination

There are no known contaminants on the WTP site.

4.5 Lime Sludge Improvements

4.5.1 Monetary Evaluation

A monetary analysis was completed for the Lime Sludge Improvements optimum performance alternative. The project budget cost for the Lime Sludge Improvements is presented in Table 18. These costs are preliminary estimates and will be further refined during the project design phase. Table 18 indicates the total estimated project budget cost for the Lime Sludge Improvements are $1,970,000.

Table 18 – Estimated Project Cost Summary

Project	Initial Capital Cost	Design Life (years)	Salvage Value
Trucks and Equipment	$1,700,000	25	$340,000
Subtotal: Estimated Capital Cost	$1,700,000		$340,000
Contractor General Conditions, Overhead and Profit	$85,000		
Contingency	$85,000		
Administration and Engineering	$100,000		
Total: Estimated Project Budget	$1,970,000		

4.5.2 *Present Worth Analysis*

A present worth analysis was completed for the construction alternatives as summarized in Table 19 and detailed in Appendix 1. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 19 – Present Worth Analysis

	No Action	Alternative 1	No Action	Alternative 2	No Action	Alternative 3
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$0	$0	$1,970,000	$1,970,000	$5,600,000	$5,600,000
O&M Cost/Year	$437,580	$10,632,043*	$228,782	$5,558,799*	$240,000	$4,604,00
Salvage Value	$0	$0	$340,000	($320,000)	$2,160,000	($2,000,000)
Total Worth		$10,632,043		$7,210,000		$8,200,000
*Cost includes a 2% annually compounded						

4.5.3 *Environmental Evaluation*

4.5.3.1 <u>Cultural Resources</u>

The proposed improvements do not have any associated construction activities. The current set-up for the lime sludge and the lagoons will be used. However, the disposal related activities will be made via investment in the necessary equipment to fulfill the sludge removal and land application on City property. The proposed projects have no direct expected historical or archeological impacts. The historical sites within the City are summarized in an excerpt from the National Register of Historic Places in Appendix 1.

4.5.3.2 <u>The Natural Environment</u>

There will no construction associated with the selected alternative. Therefore, no impact is anticipated.

4.5.4 *Mitigation*

There is no anticipated construction activities associated with the alternative selected. However, mitigation of environmental impacts will include best construction practices for land application methods, maintenance of equipment, and limiting activities to regular working hours during the week.

4.5.5 *Implementability and Public Participation*

The Project Planning Document will be available for public review. If at that time it becomes apparent that an alternative is not acceptable to the public, the alternatives will be reevaluated. Implementability of the project was evaluated. The proposed improvements will eliminate existing issues. The project does not require intermunicipal agreements.

4.5.6 Technical Considerations

The alternative does not involve design activities. The equipment selected for the sludge removal and land application will be appropriately sized.

4.5.7 Residuals

There will be no change in the amount of residuals due to this project. The volume of residuals generated correlates to the amount of water produced to meet the demand. Because demand projections are not anticipated to increase significantly, no significant impact is expected on residual production.

4.5.8 Industrial/Commercial/Institutional

The City currently serves industrial customers; however, there is no significant industrial growth anticipated within the service area. There are no other large users expected or industrial use in the City water system.

4.5.9 Growth Capacity

The lime sludge improvement project accounted the 20-year planning period. There is no significant growth expected in the service area.

4.5.10 Contamination

There are no known contaminants on the Island. Map 3 includes the contamination map.

4.6 Distribution System

4.6.1 Monetary Evaluation

A monetary evaluation was completed for the Distribution System construction alternatives. The Distribution System projects budget costs are presented in Table 20. These costs are preliminary estimates and will be further refined during the project design phase. Table 20 indicates the total estimated project budget cost for the Distribution System projects is $5,230,000.

Table 20 – Estimated Project Cost Summary

Project	Initial Capital Cost	Design Life (years)	Salvage Value
Water Meters	$3,600,000	25	$720,000
Distribution Valves	$200,000	25	$40,000
Portable Generator (Broomfield Well)	$100,000	30	$40,000
Emergency Connection (Union Township)	$235,000	25	$50,000
Subtotal: Estimated Capital Cost	$4,135,000		$850,000
Contractor General Conditions, Overhead and Profit	$420,000		
Contingency	$420,000		
Administration and Engineering	$250,000		
Total: Estimated Project Budget	$5,230,000		

Table 21 indicates the total estimated project budget cost for the Distribution System-LSLR projects is $330,000.

Table 21 – Estimated Project Cost Summary

Project	Initial Capital Cost	Design Life (years)	Salvage Value
LSLR	$250,000	50	$150,000
Subtotal: Estimated Capital Cost	$250,000		$150,000
Contractor General Conditions, Overhead and Profit	$30,000		
Contingency	$30,000		
Administration and Engineering	$20,000		
Total: Estimated Project Budget	$330,000		

4.6.2 Present Worth Analysis

A present worth analysis was completed for the construction alternatives as summarized in Table 22 and detailed in Appendix 1. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 22 – Present Worth Analysis

	Distribution System Improvements		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$5,230,000	$5,230,000	$0	$0
O&M Cost/Year	$3,000	$60,000	$50,000	$960,000
Salvage Value	$850,000	($790,000)	$0	$0
Total Worth		$4,450,000		

A present worth analysis was completed for the LSLR construction alternatives as summarized in Table 23 and detailed in Appendix 1.

Table 23 – Present Worth Analysis

	Distribution System Improvements		No-Action	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$330,000	$330,000	$0	$0
O&M Cost/Year	$3,000	$60,000	$0	$0
Salvage Value	$150,000	($140,000)	$0	$0
Total Worth		$250,000		

4.6.3 Cultural Resources

The proposed improvements for the distribution system will have no direct expected historical or archeological impacts. The historical sites within the City are summarized in an excerpt from the National Register of Historic Places in Appendix 1.

4.6.4 The Natural Environment

The work associated with the distribution system does not have any significant impacts. The only anticipated impact to the natural environment will be short term impact due to construction.

4.6.5 Mitigation

Mitigation of environmental impacts will include best construction practices such as soil erosion prevention techniques, maintenance of construction equipment, and limiting construction to regular working hours during the week.

4.6.6 Implementability and Public Participation

The Project Planning Document will be available for public review. If at that time it becomes apparent that an alternative is not acceptable to the public, the alternatives will be reevaluated. Implementability of the project was evaluated. The proposed improvements will eliminate existing issues. The project does not require intermunicipal agreements.

4.6.7 Technical Considerations

The project would be designed to meet regulatory standards and would require approval and proper permitting from the State in accordance with Act 399. Overall water system reliability is improved with proposed projects because the risk of failure due to issues is reduced.

4.6.8 Residuals

This is not applicable to the Island projects.

4.6.9 Industrial/Commercial/Institutional

The City currently serves industrial customers; however, there is no significant industrial growth anticipated within the service area. There are no other large users expected or industrial use in the City water system.

4.6.10 Growth Capacity

The distribution system improvement projects accounted the 20-year planning period and maintaining the existing water system.

4.6.11 Contamination

Map 3 includes the contamination map. No adverse site conditions are anticipated for the proposed water system improvements.

5.0 Selected Alternative

5.1 Design Parameters – Island

5.1.1 Ranney Well Collector – Optimum Performance of Existing Facilities

The Ranney Well lateral collectors will be rehabilitated by mechanical cleaning and restoring existing lateral capacity. The loose scale, slime, sand, and debris from the entire accessible length of the interior of each lateral will be removed. Supplemental pumping equipment, piping, valves, will be necessary to dewater the Collector well caisson during the lateral maintenance, development, and testing.

Due to the age of the existing laterals, it is possible that some of the laterals will not respond favorably to redevelopment due to structural failures, corrosion, etc. In those cases, individual laterals may have to be abandoned. Lateral abandonment will be accomplished by removing the valve and plating the port assembly with a blind flange. To make up for the lost capacity, there will be provisions for up to 3 new laterals. To determine the optimum location for the new laterals, a hydrogeological evaluation will be conducted. The proposed lateral locations will be based upon physical concerns – including existing piles, laterals, nearby buildings, and tanks. This evaluation shall also consider any permitting requirements.

5.1.2 Island Electrical – Optimum Performance of Existing Facilities

Ranney Building

- 500 KVA pad-mounted transformer Ranney Building will be replaced and relocated above 100-year flood elevation.
- Main Circuit Breaker (3P600A)
- Standby Generator (500 KW)
- Automatic Transfer Switch (3P600A)
- (3) Ranney Well Variable Frequency Drives (60 HP each)
- Motor Control Center (3P600A)
- (2) Step-Down Transformers
- (2) Lighting Panelboards
- (3) Well Motor Starters (150 HP, 60 HP, and 75 HP)

Valve Vault

- Step-down transformer and lighting panel

5.2 Design Parameters – WTP

The selected alternative is Optimum performance of existing facilities.

5.2.1 Clarifier Valves

The existing 20-inch clarifier influent valves will be replaced in kind with electrically actuated valves.

5.2.2 Filter Improvements

- Blower required for air scour will be replaced in kind 480 cfm, at 5 psig, 25 Hp 480 volts, 3 phase and 60 hertz.
- Filter Media (applicable to all filters).
    - Filter media material and installation shall be in accordance with AWWA Bl00.
    - Anthracite coal
        - Effective size from 1.0 to 1.2 mm
        - Uniformity coefficient not > 1.7
        - 18- inch depth of anthracite media
    - Filter sand
        - Effective size of 0.45 to 0.55mm
        - Uniformity coefficient of 1.6 or less
        - Size to be fully compatible with the anthracite media during simultaneous air- water backwash service.
        - 12-inch depth of filter sand.
- Filter Valves (applicable to all filters)
- There are filter cell inlet valves, backwash waste valves, filtered water valves and filter to waste valves. The valves will be replaced in kind, butterfly valves. The actuators will be replaced with electric actuators.
- The 24-inch cell distributer piping and the supports will be replaced with stainless steel 304 piping compatible joints and supports.

5.2.3 Recarbonation Tank and Piping

- The portion of the tank showing signs of deterioration will be removed and a new carbon steel material welded in its place. An NSF 61 compliant coating will be applied to the tank.
- Two 20-inch manually operated butterfly valves will be replaced in kind.

- 2-inch steel CO_2 piping will be demolished, and new piping will be installed from the control panel to the new injection point.
- There will be some upgrades performed to the control panel.

5.2.4 Aeration Tower

- The packing material will be replaced in kind.
- The supply fan will be replaced in kind.
- Tower will be cleaned and an NSF61 approved coating will be applied on the interior.

5.2.5 Chemical Tanks

The ferric chloride, fluoride, sodium hypochlorite and sodium hydroxide feed tanks will be replaced with similar capacity fiberglass reinforced plastic tanks.

5.2.6 WTP Roof

The existing roof area of approximately 16,200 sf will be replaced. Major components of the alternative will include:

- Removing the rock ballast.
- Replacing approximately 100 SF of corroded metal roof deck and wet insulation on the upper roof section.
- Reuse existing insulation by mechanically fastening over metal deck sections and fully adhering over concrete roof deck.
- Adhering new 0.5" coverboard over existing insulation to create a fresh base for the new EPDM membrane.
- Replacing the EPDM membrane with a new EPDM membrane that is fully adhered (Except for the tank roof which will remain ballasted by pavers).
- Replacing any damaged pavers on the tank roof.
- Reuse existing counterflashing but replace perimeter drip edge flashing to account for the extra height in the new roof system.

5.2.7 WTP Electrical

To optimize the electrical components at the WTP, several upgrades should be made as listed below.

- Pad-Mounted Medium-Voltage Primary Switchgear
- Pad-Mounted Transformer (500 KVA)
- Standby Generator (500 KW)
- Automatic Transfer Switch (3P600A)
- Main Distribution Panel (3P600A)
- Emergency Distribution Panel (3P225A)
- Distribution Panel (100A)
- (3) Step-Down Transformers
- (3) Lighting Panelboards
- Emergency Lighting Panelboard
- Variable Frequency Drives
- Motor Starters
- Disconnect Switches

5.2.8 HVAC System

- The natural gas fired boilers will be replaced with more efficient models with similar capacity.
- The air handling unit will be replaced with more efficient models with similar capacity

- Portable or portable hung dehumidifier units will be installed instead of a central unit. The number of units will be further evaluated during design.

5.2.9 SCADA System

- Hardware Upgrades and Modifications (18 Control Panels)
- Software
- Programming (Programmable Logic Controller and SCADA)
- (2) Servers
- Network Equipment
- Cabling (Fiber Optic and Network)
- Peripherals

5.3 Design Parameters – Raw Water Reservoir and Low Lift Pump station

The raw water storage reservoir capacity will be approximately 3 MG. The reservoir size and number will be evaluated during design. The low lift pump station building will be sized to house the pumps, pipe gallery, appurtenances, and electrical equipment. There will be 3 pumps in the station. One redundant pump. The pump configuration and type will be evaluated during design.

5.4 Design Parameters – Finished Water Reservoirs and Low Lift Pump station

There will be two reservoirs with approximately 2 MG. This will be further evaluated during design. There will be four high service pumps similar in capacity to the existing pumps. The pump station building will be sized to house the pumps, pipe gallery, appurtenances, and electrical equipment.

5.5 Design Parameters – Lime Sludge Improvements

The selected alternative includes the City purchasing all the equipment and vehicles needed to empty the lagoons and land apply on City owned property. City staff will provide the necessary labor to fulfill this requirement.

5.6 Design Parameters – Distribution System

5.6.1 Water Meter Replacement

The existing water meters within the distribution system will be replaced with AMI type meters. The meter size would remain the same.

5.6.2 Distribution System Valves

The valves in the distribution system will be replaced in kind.

5.6.3 Emergency Connection with Union Township

The site selection will be made during design. A concrete structure ~350 sq ft, 12 feet deep will house the emergency connection piping, valves, and flow meters. There will be provisions to drain the structure via a sump pump. The structure size, pipe, valve, and flow meter sizing will be evaluated during design.

5.6.4 Lead Service Line Replacements

The identified lead and galvanized services will be replaced. This alternative will address compliance with the Safe Drinking Water Act.

5.7 Project Map

The following figures are included for the selected alternatives:

- Figure 5-Island Process Improvements
- Figure 6-Island Electrical Improvements
- Figure 7-WTP Lower-Level Process Improvements
- Figure 8-WTP Upper-Level Process Improvements
- Figure 9-WTP Lower-Level HVAC Improvements
- Figure 10-WTP Upper-Level HVAC and Building Improvements
- Figure 11-WTP Site Improvements

5.8 Schedule for Design and Construction

The project schedule, consistent with the quarterly DWSRF funding deadlines, is presented in Table 24.

Table 24 – Project Schedule

Task	Estimated Milestone					
Final Design	Island	WTP	Raw Water Storage & Low Lift Pump Station	Lime Sludge Improvements	Distribution System-LSLR	Distribution System-Water meters, valves, emergency connection
EGLE Fiscal Year and Quarter Planned for Project	FY 2025 Quarter 4	FY 2024 Quarter 4	FY 2025 Quarter 4	FY 2024 Quarter 4	FY 2024, Quarter 4	FY 2025 Quarter 4
Final Design	April 2026	April 2025	April 2026	April 2025	April 2025	April 2026
Construction Permit	May 2026	May 2025	May 2026	May 2025	May 2025	May 2026
Bidding	June 2026	June 2025	June 2026	June 2025	June 2025	June 2026
DWSRF Funding Award	August 2026	August 2025	August 2026	August 2025	August 2025	August 2026

5.9 Cost Estimate

Table 25 presents the estimated project costs for projects. The proposed costs are in 2023 dollars.

Table 25 – Project Estimate

Project	Total Estimated Project Cost
Island	$4,760,000
WTP	$10,780,000
Raw Water Reservoir & Low Lift Pump Station	$9,360,000
Finished Water Reservoirs and High Service Pump Station	$9,080,000
Lime Sludge Improvements	$1,970,000
Distribution System	$5,560,000

5.10 User Costs

Table 26 – Estimated User Rate Increase

Year	Eligible Amount	New Annual Debt	Average Monthly User Rate Increase
2024	$13,100,000	$791,521	$11.09
2025	$24,300,000	$1,468,242	$20.57
Total	**$37,400,000**	**$2,259,763**	**$31.65**

5.11 Overburdened Community

EGLE has revised the previous "Disadvantaged Community" criteria and created a new metric for evaluating communities applying for DWSRF funding. Communities applying for DWSRF funding can be classified as "overburdened" or "significantly overburdened" based on the cost of the projects and the median annual household income (MAHI) of the community. Based on the qualification criteria provided by EGLE, preliminary determinations indicate that the City qualifies as overburdened. A worksheet was filled out and sent to EGLE to confirm the overburdened status.

5.12 Ability to Implement the Selected Alternatives

The City owns and operates the water supply, water treatment and distribution system. Therefore, the City has direct authority to implement the improvements mentioned in this Project Planning Document. The proposed projects for the water system will occur within the City limits and require no consent from adjacent municipalities as they are not connected to the City's water system. All financial and loan related work will be handled by the City of Mt Pleasant Finance Department.

6.0 Environmental Evaluation

6.1 Historical/Archeological/Tribal Resources

The northern half of the service area is home to members of the Saginaw Chippewa Indian Tribe of Michigan. While tribal residents do contribute to the WRRF influent flow, the tribe's gaming and entertainment services provide their own water and wastewater treatment. The national register of historic places lists 4 places in Isabella County. Three of these locations are in Mt. Pleasant and listed in Table 27.

Table 27 – Isabella Historic Sites

Name	Address
Doughty House	301 Chippewa, Mt. Pleasant
Michigan Condensed Milk Factory	320 W. Broadway St., Mt. Pleasant
St. John's Episcopal Church	206 W. Maple St., Mt. Pleasant

This project is not anticipated to affect the any Historical/Archeological/Tribal sites, as construction will be limited to the locations of the WTP, and the Island storage and distribution site.

6.2 Water Quality

The proposed projects will meet compliance requirements of the Safe Drinking Water Act. The proposed projects will not affect surface water or groundwater quality or quantity. The major surface waters are depicted in Map 3.

6.3 Land/Water Interface

The wetlands are indicated in Map 4. No construction work is anticipated within wetland areas. The soils and topographical map are included in Map 5 and 6. The proposed projects will not have any negative impacts on the wetlands. The flood map is included in Map 7. The proposed work at the Island site will be coordinated with the water management division of EGLE for any permits that might be required. No negative impacts to the flood boundaries are expected because of the proposed projects.

6.4 Endangered Species

Endangered or threatened species are defined as those species that are or could become endangered or threatened, and therefore are protected under the Endangered Species Act. The objective of the act is to preserve and restore species threatened with extinction. The Michigan Natural Features Inventory (MNFI) was also reviewed by county and the threatened or endangered listing is provided in Table 28. The additional listings of flora and fauna with a state status of special concern is included in Appendix 2.

Table 28 – Isabella County Federal Endangered/Threatened Species List

Scientific Name	Common Name	Status
Alasmidonta viridis	Slippershell	T
Calypso bulbosa	Calypso or fairy-slipper	T
Centronyx henslowii	Henslow's sparrow	E
Gallinula galeata	Common gallinule	T
Gavia immer	Common loon	T
Ligumia recta	Black sandshell	E
Rallus elegans	King rail	E

The proposed projects will occur within previously disturbed areas where no significant wildlife habitat is present. No tree removal is anticipated that could have potential impacts on the species listed in Table 24. The natural features inventory map is included in Map 8.

If the projects deemed equivalency by EGLE then governmental agencies like the MNFI, State Historic Preservation Office, and Tribal Historic Preservation Office will be contacted for consultation.

6.5 Agricultural Land

Prime farmland locations are depicted in Map 9. The proposed projects will not negatively impact existing land use.

6.6 Social/Economic Impact

The proposed water system and treatment improvements will result in direct economic and social benefits. Public health and safety will benefit from meeting the compliance set forth by the Safe Drinking Water Act, increased water system quality, and greater system reliability.

The construction of the projects will create jobs and contribute favorably to local contractors and the economy.

6.7 Construction/Operational Impact

The construction associated with the proposed improvements will occur at the existing WTP and the Island locations. The activities associated with the construction are temporary in nature and no long-term adverse effects are anticipated. Construction for projects of this type is generally limited to the hours 7:00 a.m. to 7:00 p.m. Monday through Friday. No adverse impacts to major street traffic patterns are anticipated.

6.8 Indirect Impacts

6.8.1 Changes in Development

No significant changes in development are anticipated due to the proposed improvements. However, the proposed projects will enhance the existing water system reliability.

6.8.2 Changes in Land Use

The proposed projects will not have an impact on existing or future land use.

6.8.3 Changes in Air or Water Quality

The proposed projects will not impact air or surface water quality.

6.8.4 Changes to Natural Setting or Sensitive Ecosystems

The proposed projects will not have an impact on the natural setting or sensitive ecosystems.

6.8.5 Changes to Aesthetic Aspects of the Community

The proposed projects will not have long term aesthetic changes because the work is either underground, within existing structures, at the WTP or Island sites, and the land will be restored post construction.

6.8.6 Resource Consumption

Resource consumption in the form of materials, labor, and equipment will be required to construct the proposed projects.

7.0 Mitigation Measures

7.1 Mitigation Measures for Short Term Impact

Measures that will be taken to avoid, eliminate, or mitigate potential short-term environmental impacts include the following:

- Traffic: Use of designated traffic routes for construction traffic, as well as flagmen, warning signs, barricades, and cones.
- Air emissions: Use of calcium chloride or water for dust control and proper maintenance on heavy equipment to reduce exhaust emissions.
- Noise control: Use designated daytime work hours, use mufflers on all equipment, and minimize work on weekends and/or holidays.
- Soil erosion and sedimentation control (SESC): Appropriate measures such as use of riprap, hay bales, erosion control fence, silt fence, etc.
- Restoration: Use topsoil, seed, sod, mulch, gravel, and pavement. Vegetation that is removed as a part of the construction will be replaced. All areas will be restored to their existing grade and as closely as possible to their original appearance.
- Dewatering: No, or limited, dewatering is expected as part of the proposed projects. If dewatering is needed, provisions will be taken to limit the impact to the storm or sanitary systems where the water will be directed. The water management division of EGLE will be contacted if necessary to coordinate any requirements this activity.
- Long term environmental impacts are not anticipated for the proposed projects. Measures will be taken to avoid, eliminate, or mitigate potential long term environmental impacts. Using vacuum boring excavation, hand digging, conventional machine excavation, or a combination thereof will be used such that disturbance is minimal.

The proposed projects are not anticipated to create additional indirect environmental impacts.

7.2 Mitigation Measures for Long Term Impact

Every effort will be made to prevent long-term or irreversible impacts because of the project. The selected alternative has been evaluated to determine any potential of long-term impacts. Where short-term impacts are unavoidable, mitigation measures will be considered to ensure that sensitive features do not suffer permanent or irreversible adverse impacts.

Measures that will be taken to avoid, eliminate, or mitigate potential long-term environmental impacts include the preparation and implementation of a SESC Plan. The SESC Plan for the construction of the selected alternative will be filed with the local SESC Agency. The plan will also be reviewed by the EGLE Land and Water Management Division. The plan will summarize the quantity of soils that will be excavated, locations where soil will be stored, the destination of soils (onsite or offsite), and measures that will be taken (silt fence, sod, etc.) to minimize erosion.

8.0 Public Participation

8.1 Public Meeting Advertisement

A Notice of Public Meeting for the DWSRF Planning Document for the City of Mt. Pleasant water system improvements will be posted on the City's website and on the City's social media pages, on May 10, 2023. (https://www.mtpleasant.org/departments/division_of_public_works/water/) The EGLE project manager will be provided with a link to the notice.

The advertisement will briefly describe the proposed projects and estimated costs, mention the availability of the report for viewing, and invite written comments from the public.

The Planning Document will be made available on the City's website for public review and comment starting May 10, 2023. Written comments are requested to be received no later than May 22, 2023, the date of the public hearing.

A screenshot of the Notice of Public Hearing will be included in the final Planning Document.

8.2 Formal Public Hearing

A public hearing will be held at the regularly scheduled City Council meeting on May 22, 2023. The meeting minutes from the public hearing will be included in the final Project Planning Document.

The following items were discussed during the public hearing:

- A description of the project needs and problems to be addressed by the proposed projects and the principal alternatives that were considered.
- A description of the selected alternatives, including capital costs.
- A description of project financing and anticipated costs to users, including the proposed method of project financing and the proposed annual charge to the typical residential customer.
- A description of the anticipated social and environmental impacts associated with the selected alternatives and the measures that will be taken to mitigate adverse impacts.

The public hearing meeting minutes and a PDF of the presentation will be included in the final Planning Document.

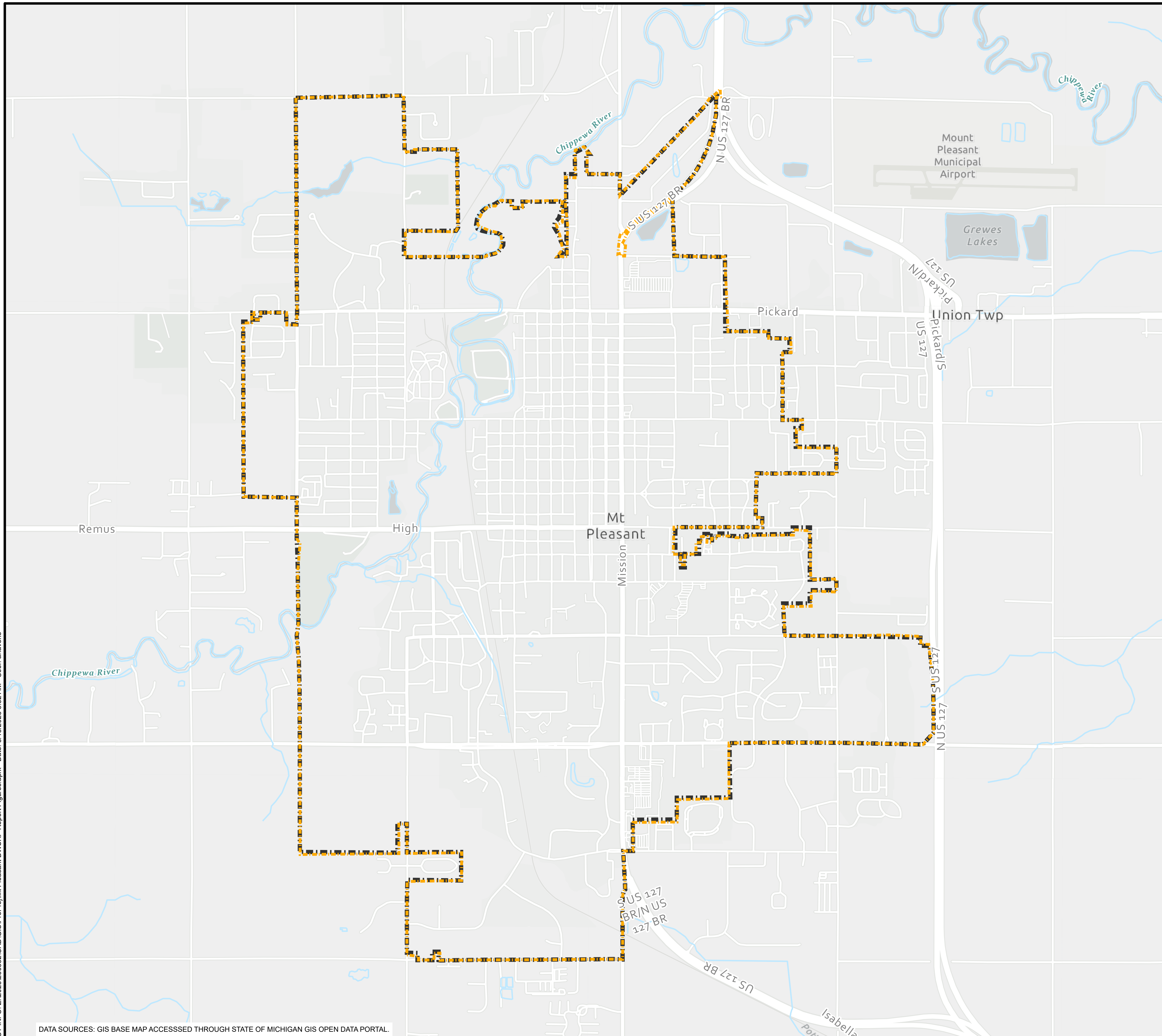
8.3 Comments Received and Answered

Comments received during the public comment period and responses provided will be included in the final Planning Document.

8.4 Adoption of the Planning Document

A resolution to formally adopt the Planning Document and implement the selected alternatives will be submitted to EGLE with the final Planning Document.

Figures



DATA SOURCES: GIS BASE MAP ACCESSSED THROUGH STATE OF MICHIGAN GIS OPEN DATA PORTAL.

LEGEND

- Water System Service Area
- City Limit

NORTH

WATER SERVICE AREA

0 1,250 2,500 FEET

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City of Mt. Pleasant
Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

PROJECT NO.
230532

FIGURE NO.
1

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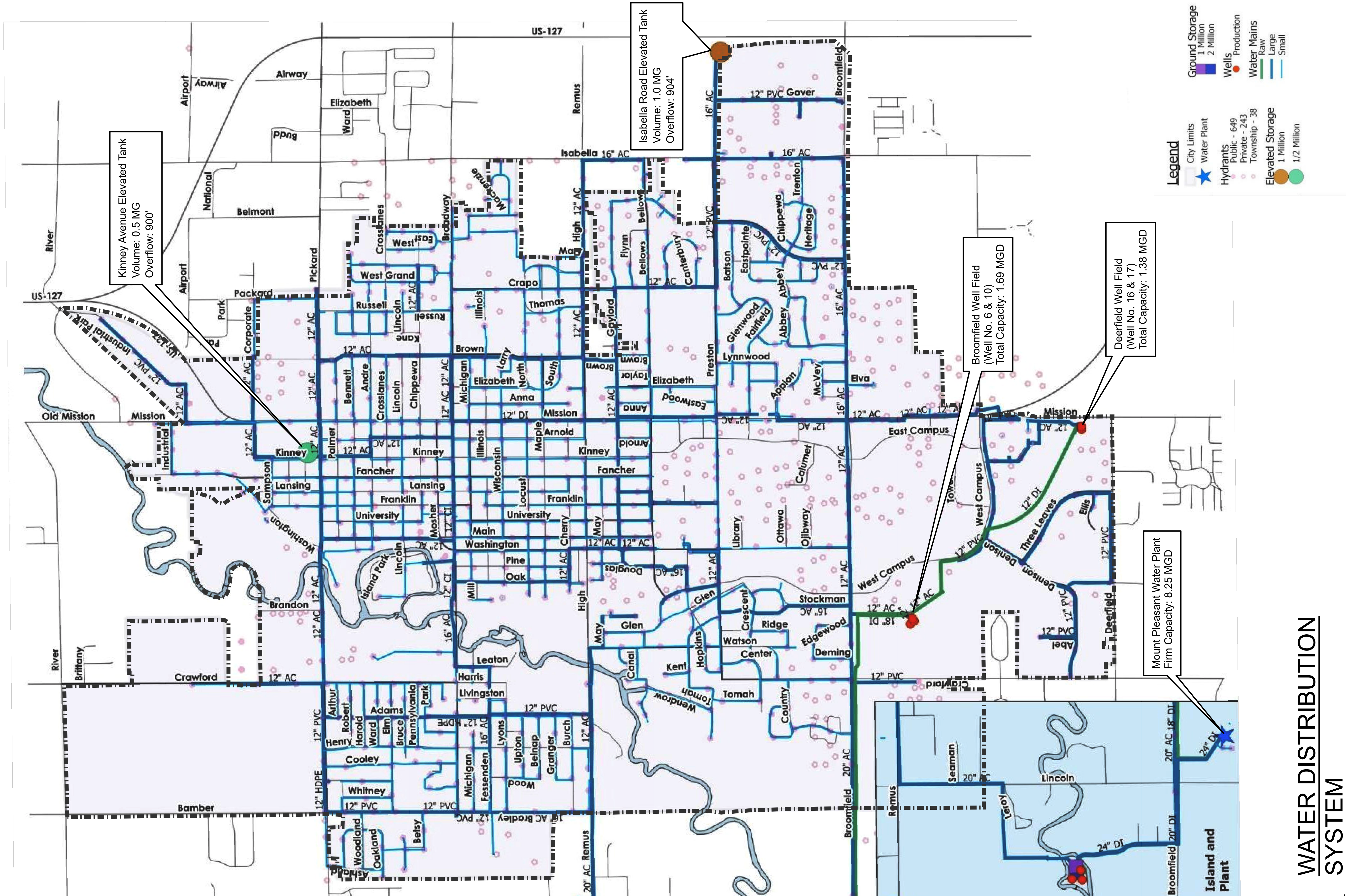

WATER DISTRIBUTION SYSTEM

City of Mt. Pleasant
Isabella County, Michigan

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PROJECT NO.
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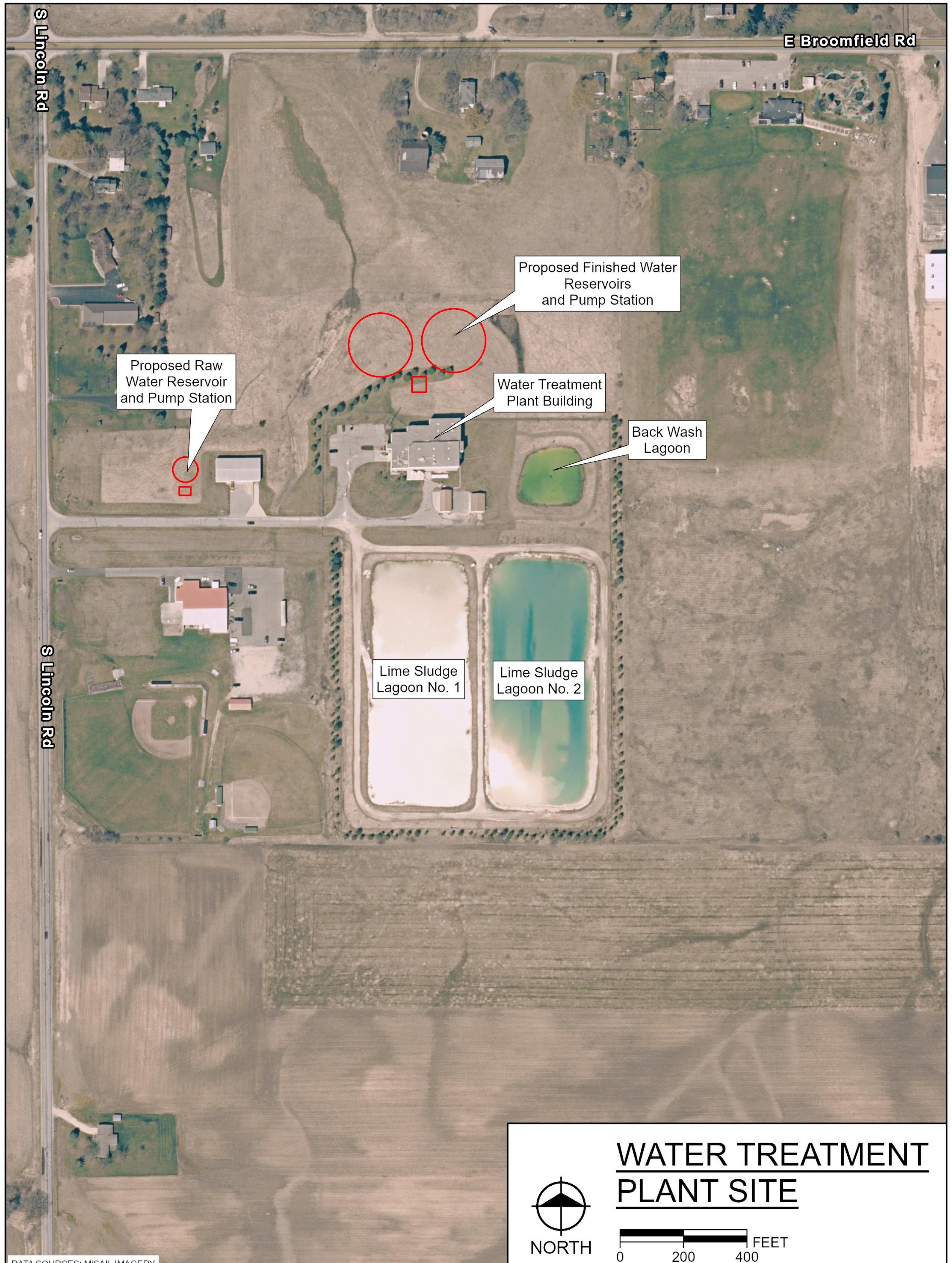
FIGURE NO.
2

PLOT INFO: Z:\2023\230532\CAD\GIS\ProProj\Mt Pleasant DWSRF Report Figures.aprx Layout: Figure 2 - Water Distribution System Date: 4/24/2023 9:13 AM User: ahavens



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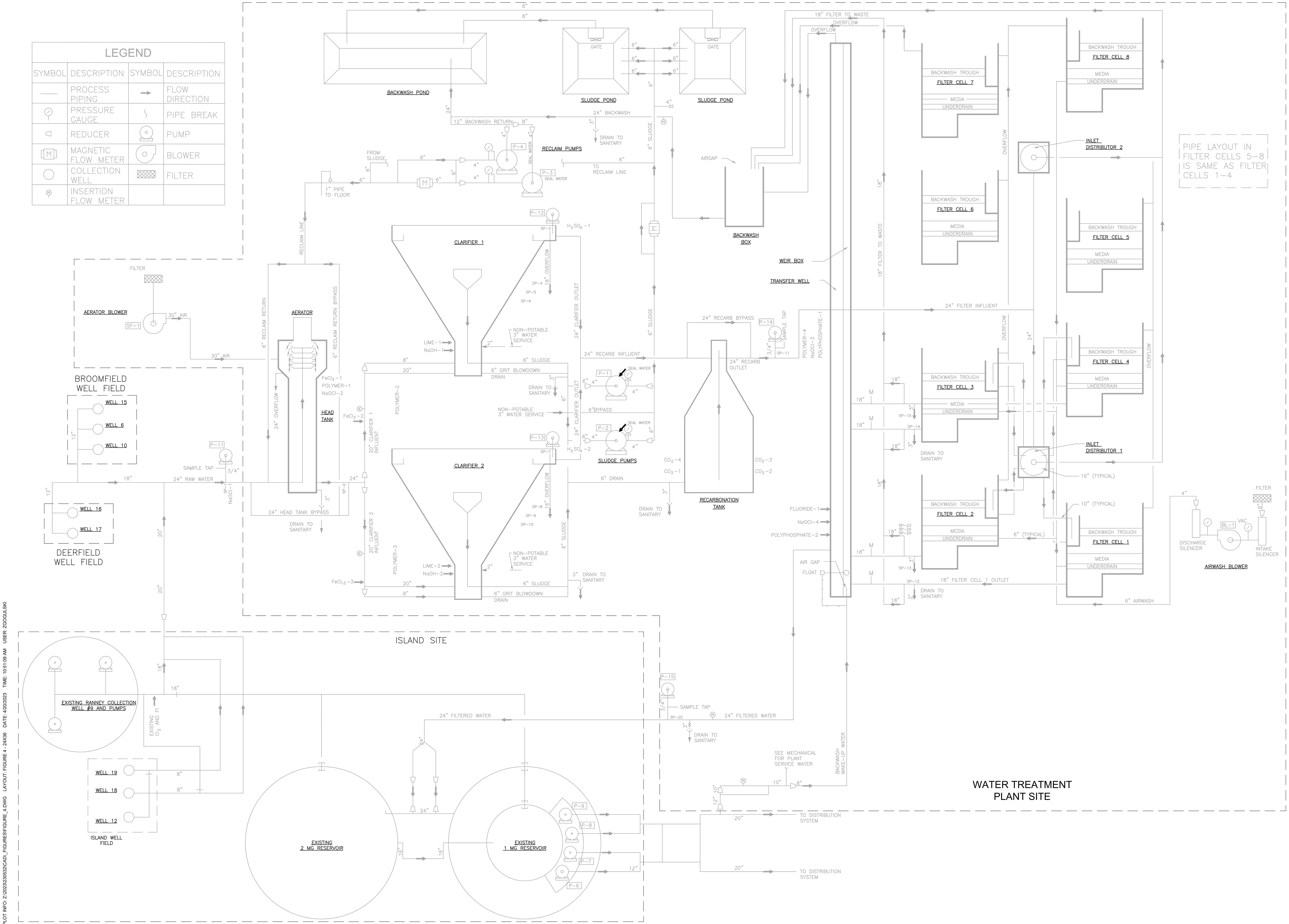
PROJECT NO.
230532

FIGURE NO.
3

PLOT INFO: Z:\2023\230532\CAD\GIS\ProProj\Mt Pleasant DWSRF Report Figures.aprx Date: 5/9/2023 10:43 AM User: cashbay

LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	PROCESS PIPING		FLOW DIRECTION
	PRESSURE GAUGE		PIPE BREAK
	REDUCER		PUMP
	MAGNETIC FLOW METER		BLOWER
	COLLECTION WELL		FILTER
	INSERTION FLOW METER		



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Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF)
Planning Document

REVISIONS

NOT FOR CONSTRUCTION

Drawn By MJS
Designer MBK
Reviewer
Manager BWV

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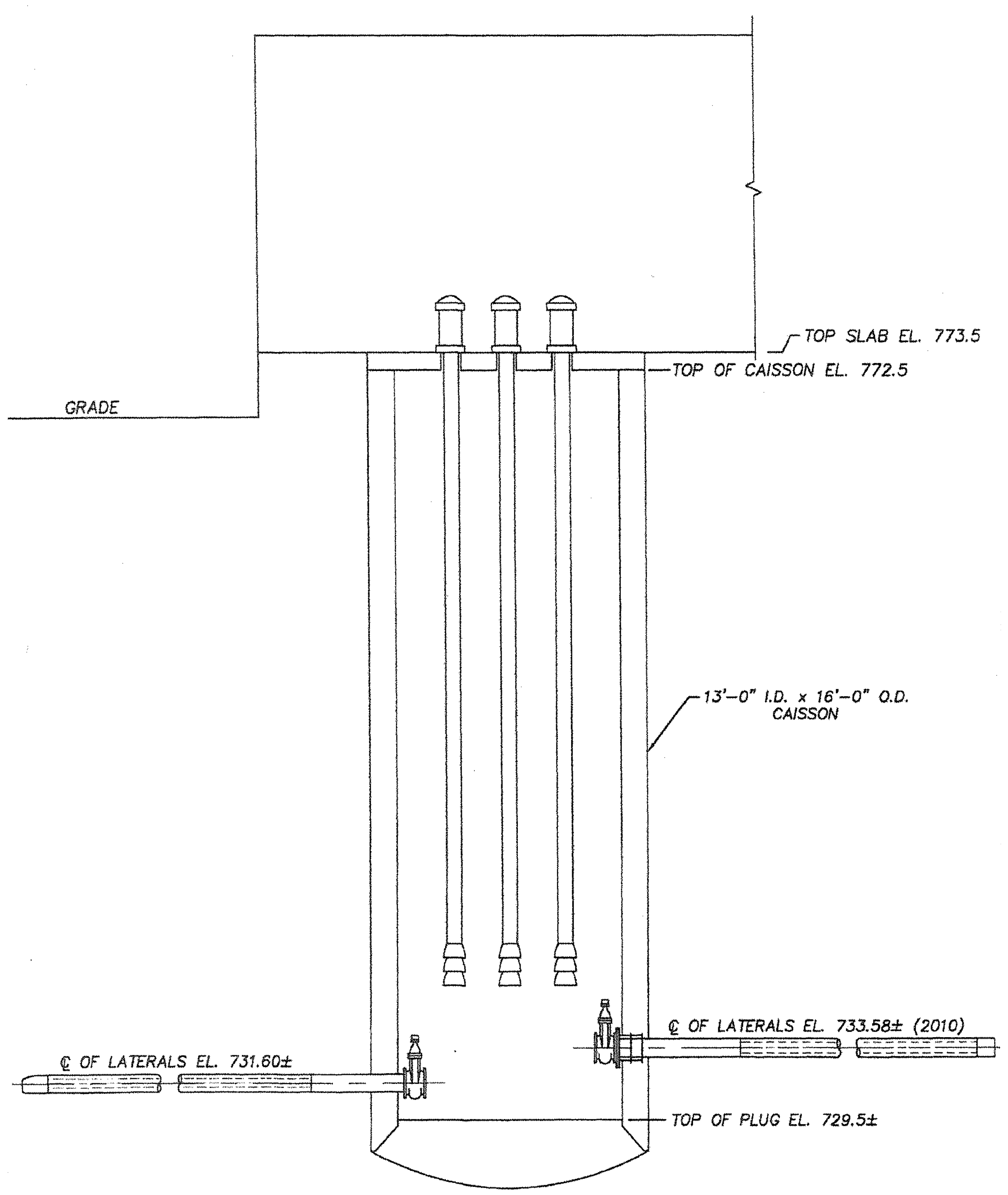
PROJECT NO.
230532

FIGURE NO.
4

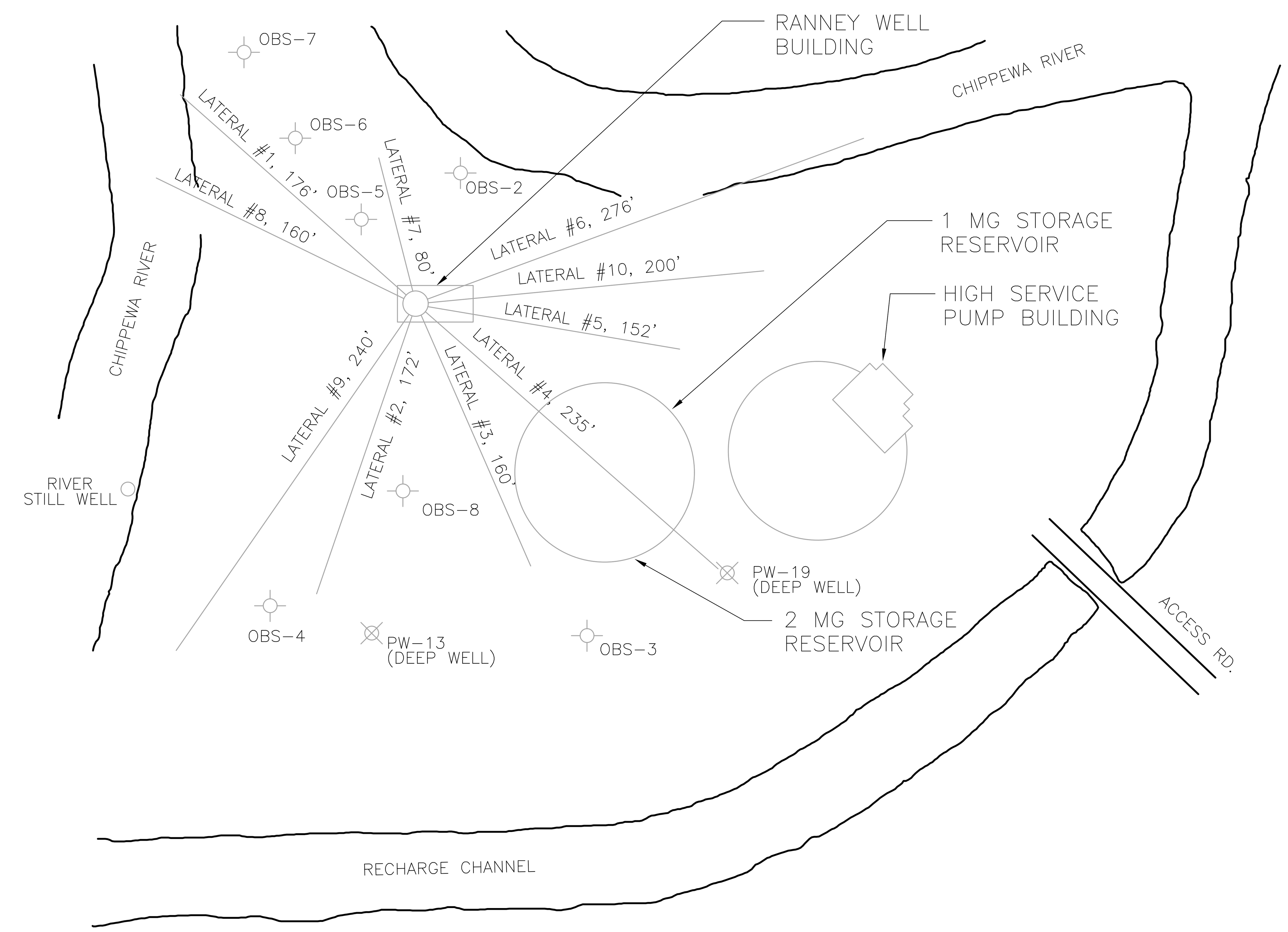
PLOT INFO: Z:\2023\230532\CAD_FIGURES\FIGURE_4.DWG LAYOUT: FIGURE 4 - 24X36 DATE: 4/20/2023 TIME: 10:51:09 AM USER: ZGOGULSKI

NOTES

1. LATERALS #4 & #5 HAVE A BLIND FLANGE INSTALLED (2010).
2. LATERALS #1, #2, #3, #6, & #7 HAVE A GRATE INSTALLED ON THE GATE VALVE (2010).



1 SECTION
NO SCALE



RANNEY WELL LATERAL PLAN
NO SCALE

NORTH

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Drawn By ZAG
Designer MBK
Reviewer
Manager BWV

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PROJECT NO.
230532

FIGURE NO.
5

PLOT INFO: Z:\2023\230532\CAD_FIGURES\FIGURE_5-6.DWG LAYOUT: FIGURE 5 DATE: 5/9/2023 TIME: 5:10:00 PM USER: ZGOGULSKI

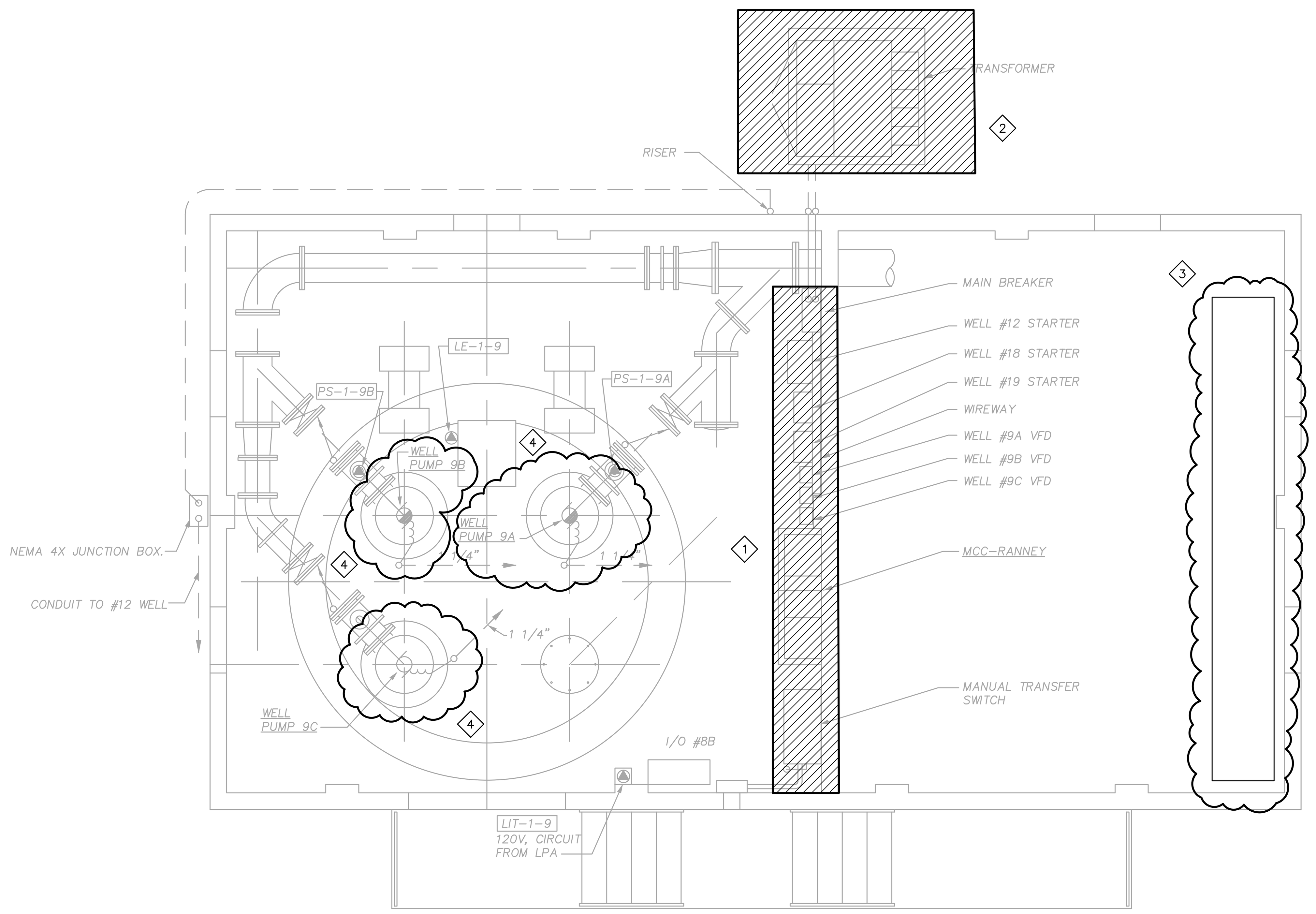
LEGEND

PROPOSED AREA OF WORK

DEMOLITION

KEY NOTES

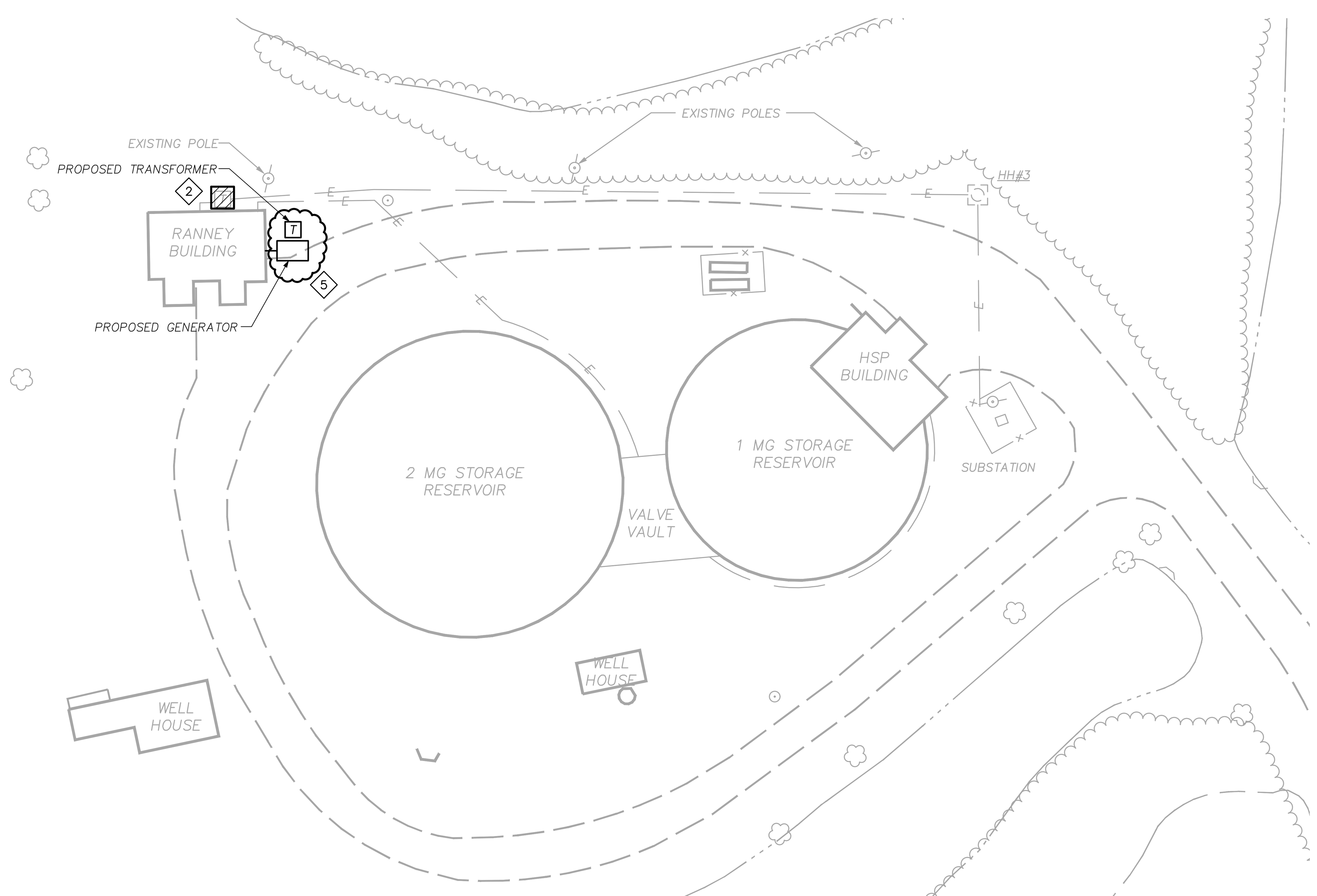
1. DEMOLISH EXISTING ELECTRICAL EQUIPMENT.
2. DEMOLISH EXISTING TRANSFORMER, SEE ELECTRICAL SITE PLAN THIS SHEET.
3. INSTALL NEW ELECTRICAL EQUIPMENT INCLUDING WELL PUMP VFDS, AUTOMATIC TRANSFER SWITCH, MCC, AND BREAKER.
4. REPLACE EXISTING RANNEY WELL MOTORS.
5. INSTALL NEW TRANSFORMER, GENERATOR, AND ASSOCIATED CONDUIT.



RANNEY BUILDING ELECTRICAL PLAN

SCALE: 1/4" = 1'-0"

NORTH



ELECTRICAL SITE PLAN

SCALE: 1" = 40'

NORTH

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Manager	BWV

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PROJECT NO.

230532

FIGURE NO.

6

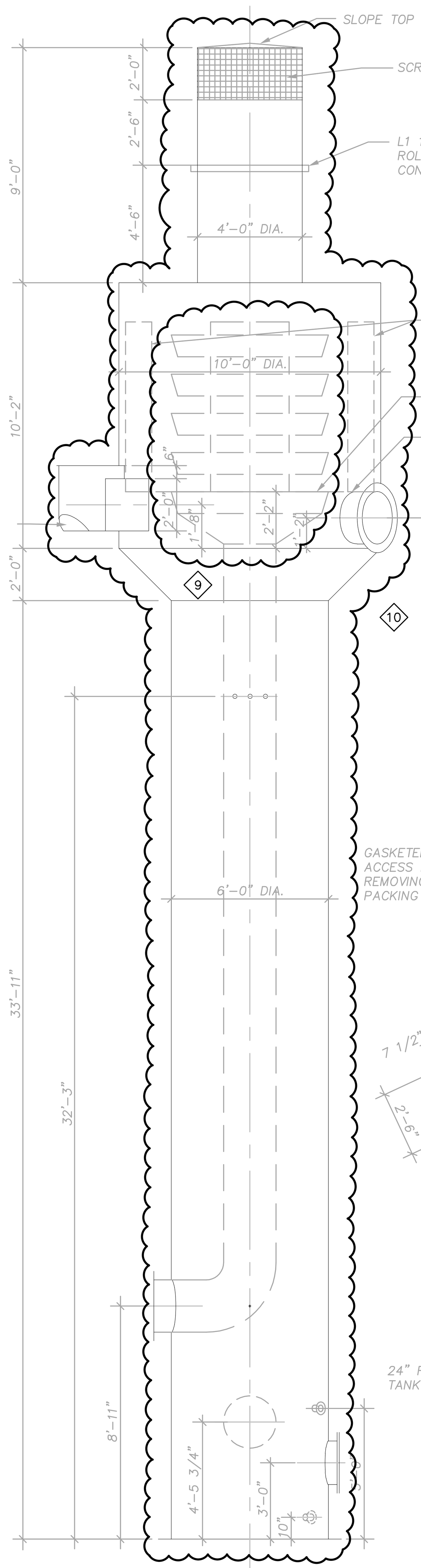
PLOT INFO: Z:\2023\230532\CAD_FIGURES\FIGURE_5-6.DWG LAYOUT: FIGURE 6 DATE: 5/9/2023 TIME: 5:07:54 PM USER: ZGOGULSKI

LEGEND

PROPOSED AREA OF WORK

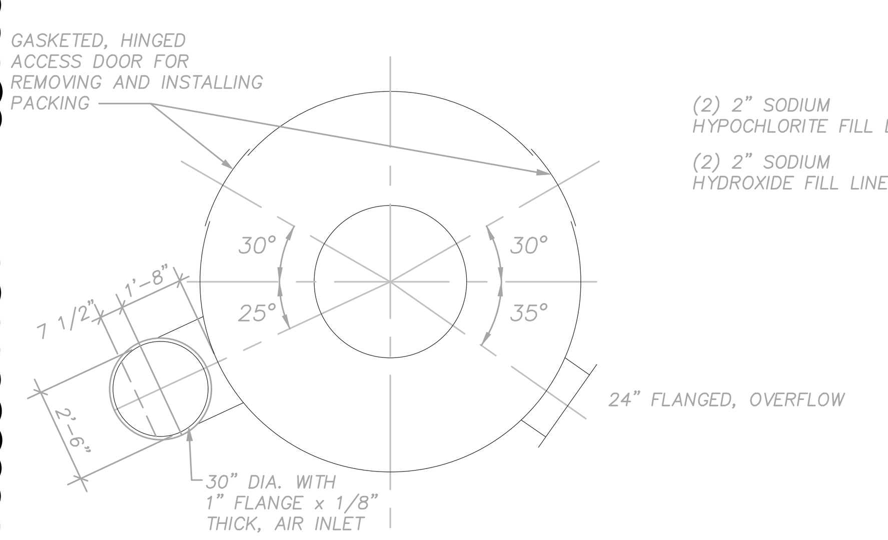
KEY NOTES

1. DEMOLISH EXISTING CLARIFIER INFLUENT VALVES. INSTALL NEW VALVES WITH ELECTRIC ACTUATORS.
2. DEMOLISH EXISTING CARBON DIOXIDE INJECTORS AND FEED PIPING FROM THE CARBON DIOXIDE CONTROL PANEL TO THE RECARBONATION TANK.
3. REPLACE EXISTING FERRIC CHLORIDE BULK TANKS T–1 AND T–2.
4. REPLACE EXISTING FLUORIDE BULK TANK T–3.
5. REPLACE EXISTING SODIUM HYDROXIDE BULK TANKS T–8 AND T–9.
6. REPLACE EXISTING SODIUM HYPOCHLORITE BULK TANKS T–6 AND T–7.
7. DEMOLISH EXISTING FILTER BACKWASH VALVES. INSTALL NEW VALVES WITH ELECTRIC ACTUATORS.
8. REPLACE 2" CARBON DIOXIDE SUPPLY PIPING.
9. REPLACE AERATOR MEDIA.
10. RECOAT HEAD TANK/AERATOR.
11. REPLACE EXISTING INLINE AND MAGNETIC FLOW METERS.



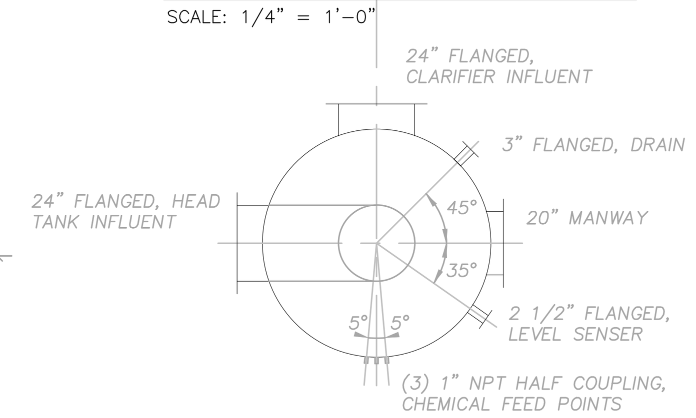
HEAD TANK/AERATOR

SCALE: 1/4" = 1'-0"



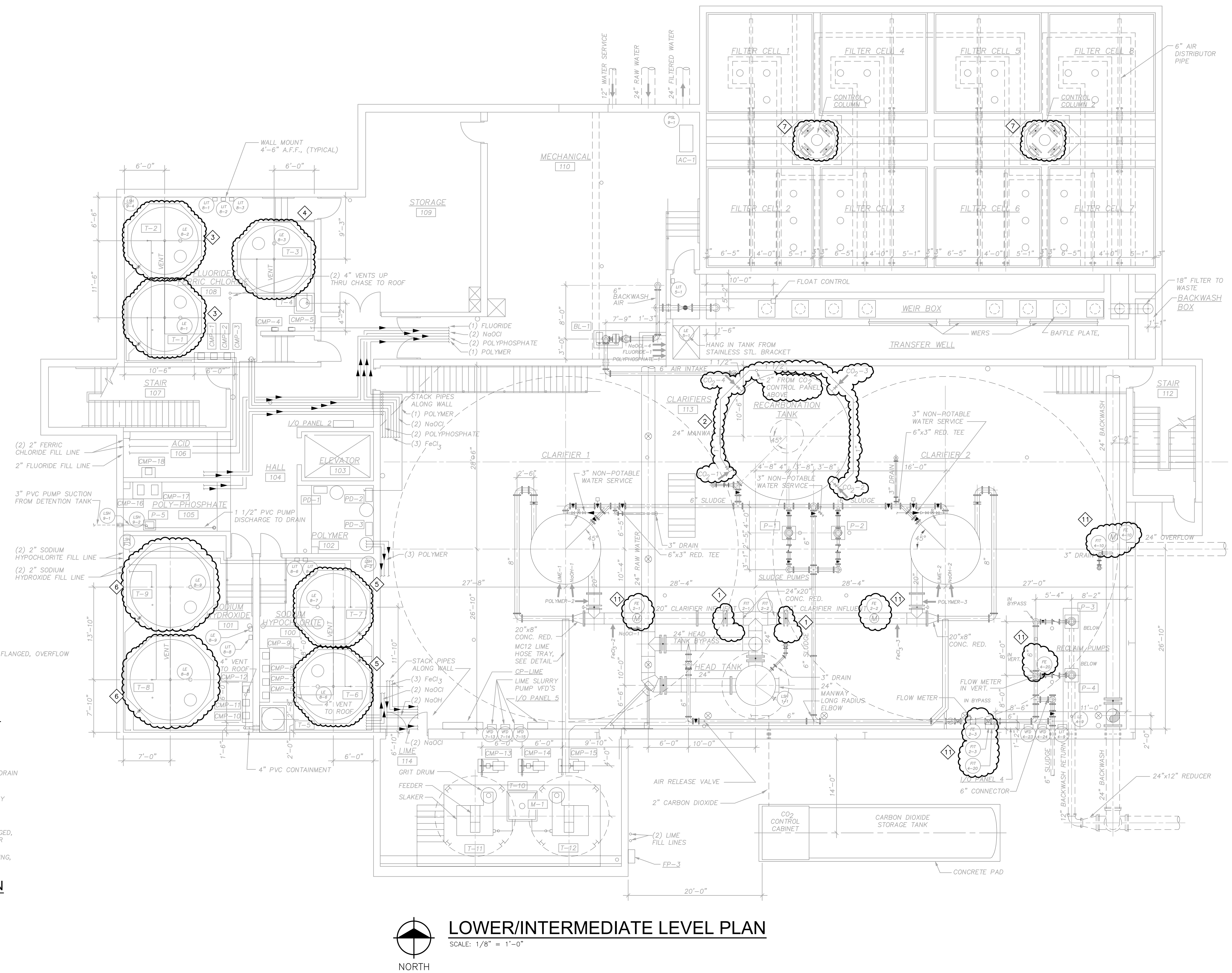
PLAN OF UPPER SECTION

SCALE: 1/4" = 1'-0"



PLAN OF LOWER SECTION

SCALE: 1/4" = 1'-0"



LOWER/INTERMEDIATE LEVEL PLAN

SCALE: 1/8" = 1'-0"

PLOT INFO: Z:\2023\230532\CAD_FIGURES\FIGURE_7-8.DWG LAYOUT: FIGURE 7 DATE: 4/20/2023 TIME: 10:54:48 AM USER: ZGOGULSKI

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Drawn By	ZAG
Designer	MBK
Reviewer	
Manager	BWV

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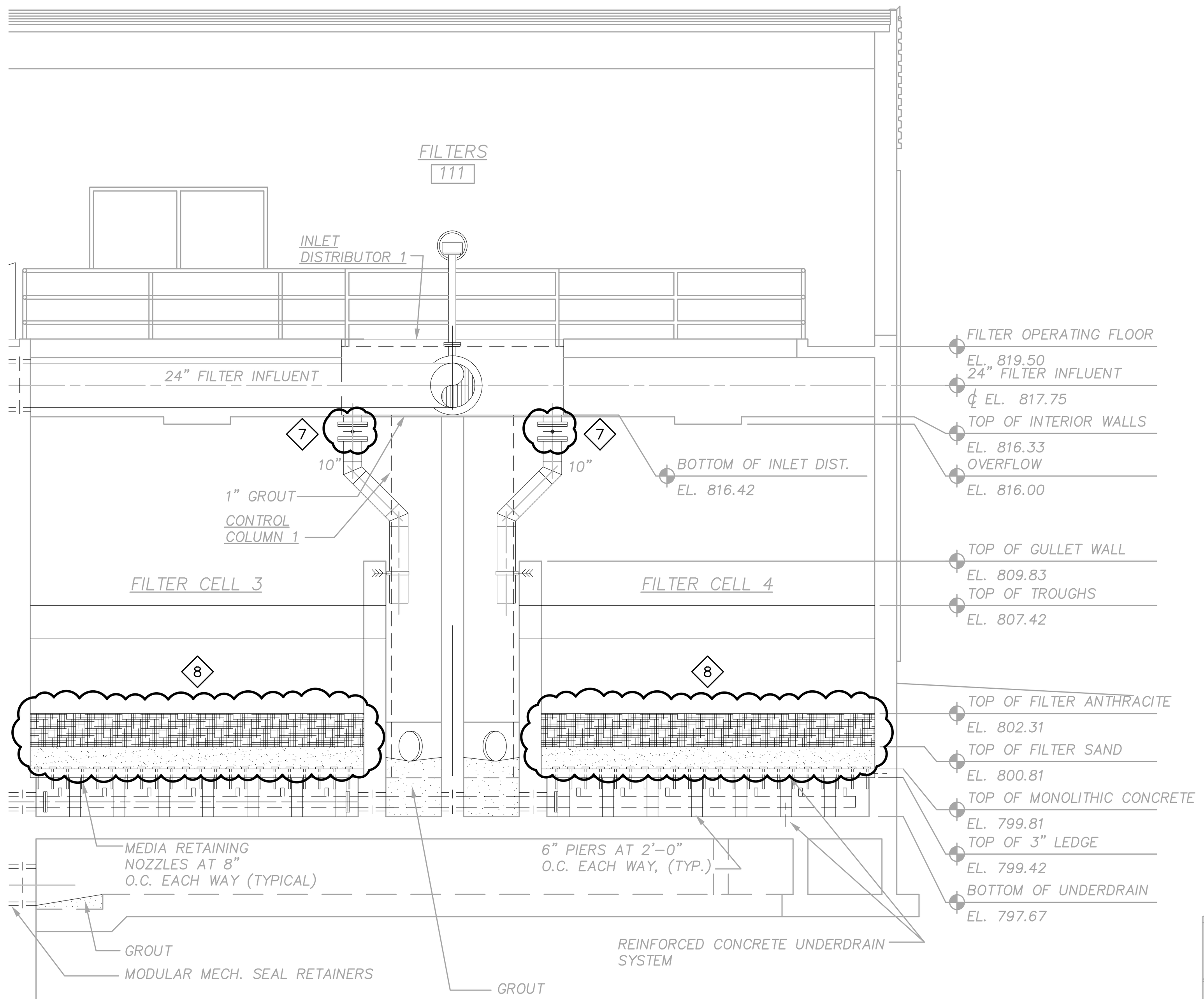
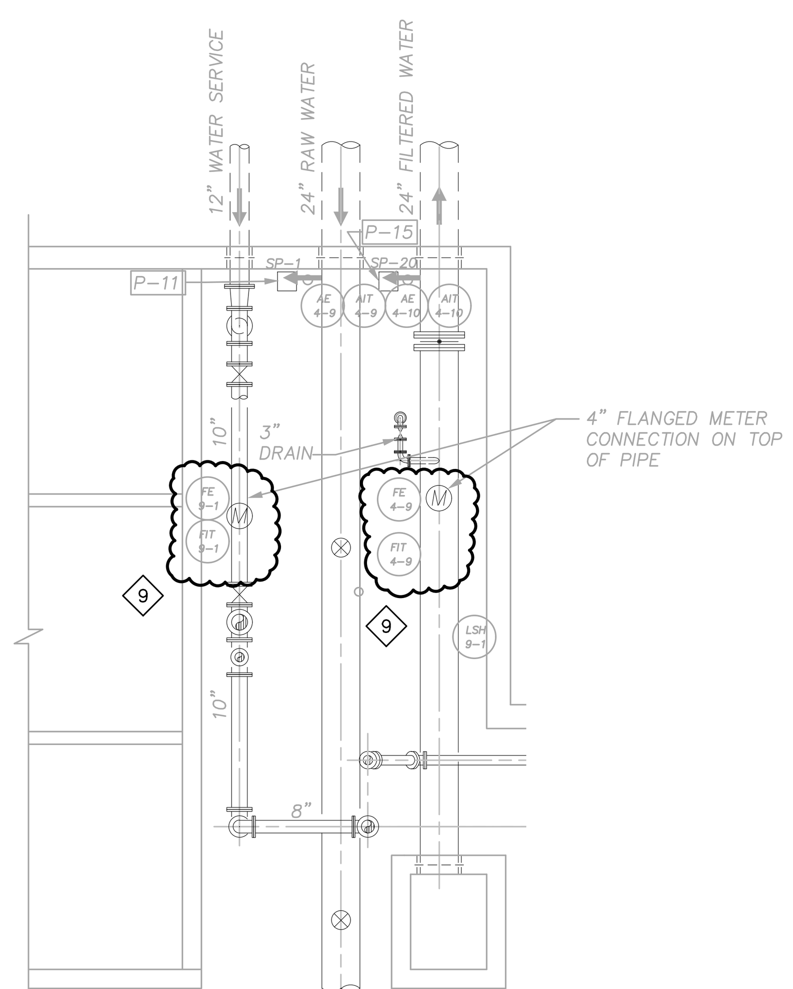
PROJECT NO.
230532

FIGURE NO.
7



TYPICAL FILTER DETAIL

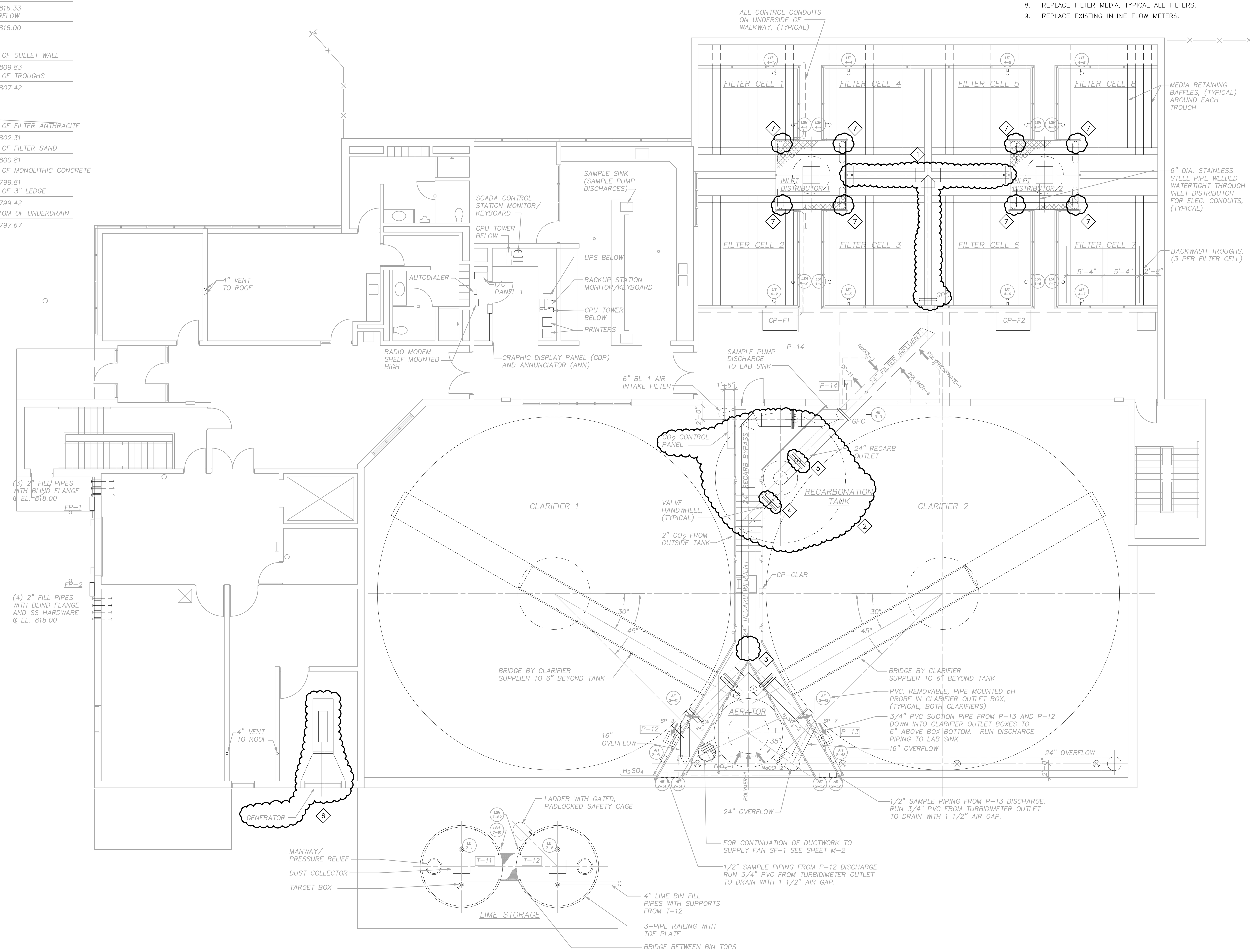
SCALE: 3/16" = 1'-0"



NORTH

LOWER LEVEL PIPE GALLERY PLAN

SCALE: 1/8" = 1'-0"



NORTH

UPPER LEVEL PLAN

SCALE: 1/8" = 1'-0"

LEGEND

PROPOSED AREA OF WORK

KEY NOTES

1. REPLACE FILTER INFLUENT PIPING, VALVES, AND SUPPORTS.
2. REPAIR CORROSION DAMAGE TO EXISTING RECARBONATION TANK. REPLACE EXISTING CARBON DIOXIDE CONTROL PANEL.
3. INSTALL NEW CARBON DIOXIDE INJECTION POINT IN RECARB INFLUENT PIPING. RUN CARBON DIOXIDE SUPPLY PIPING FROM INJECTION POINT TO CARBON DIOXIDE CONTROL PANEL.
4. REPLACE EXISTING RECARB INFLUENT ISOLATION VALVE.
5. REPLACE EXISTING RECARB EFFLUENT ISOLATION VALVE.
6. DEMOLISH EXISTING GENERATOR. INSTALL NEW PERMANENT GENERATOR OUTSIDE ON THE WATER PLANT SITE.
7. DEMOLISH EXISTING FILTER INFLUENT VALVES. INSTALL NEW VALVES WITH ELECTRIC ACTUATORS.
8. REPLACE FILTER MEDIA, TYPICAL ALL FILTERS.
9. REPLACE EXISTING INLINE FLOW METERS.

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PROJECT NO.
230532

FIGURE NO.
8

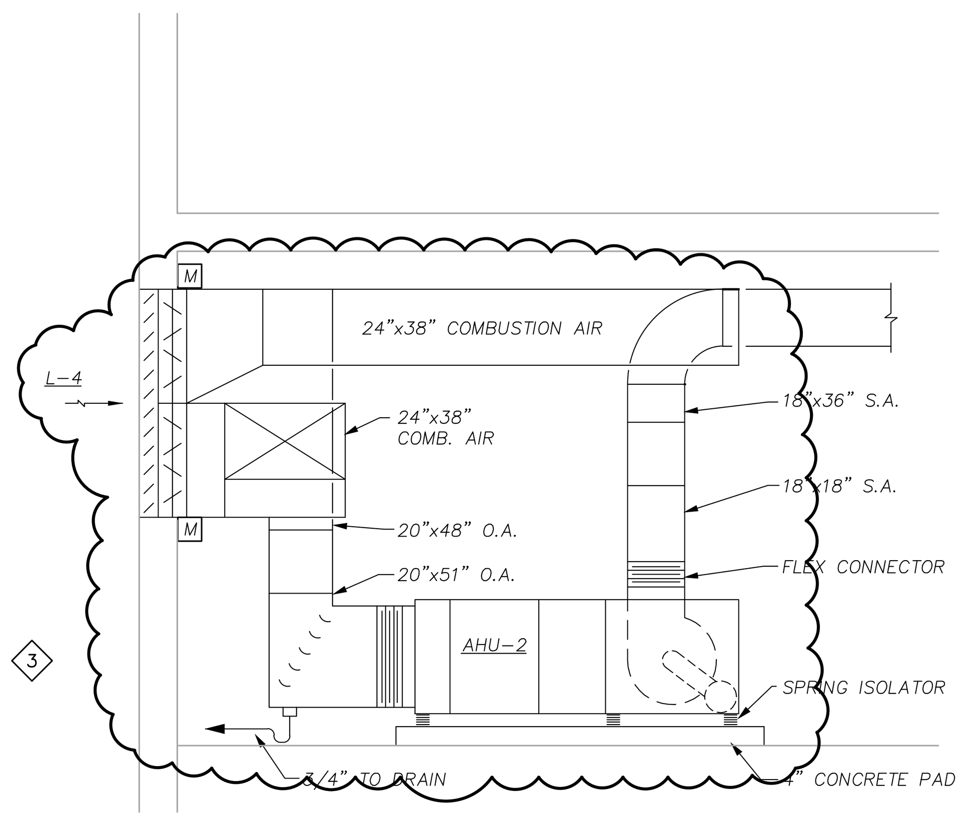
PLOT INFO: Z:\2023\230532\CAD_FIGURES\FIGURE_7-8.DWG LAYOUT: FIGURE 8 DATE: 4/20/2023 TIME: 10:55:03 AM USER: ZGOGULSKI

LEGEND

PROPOSED AREA OF WORK

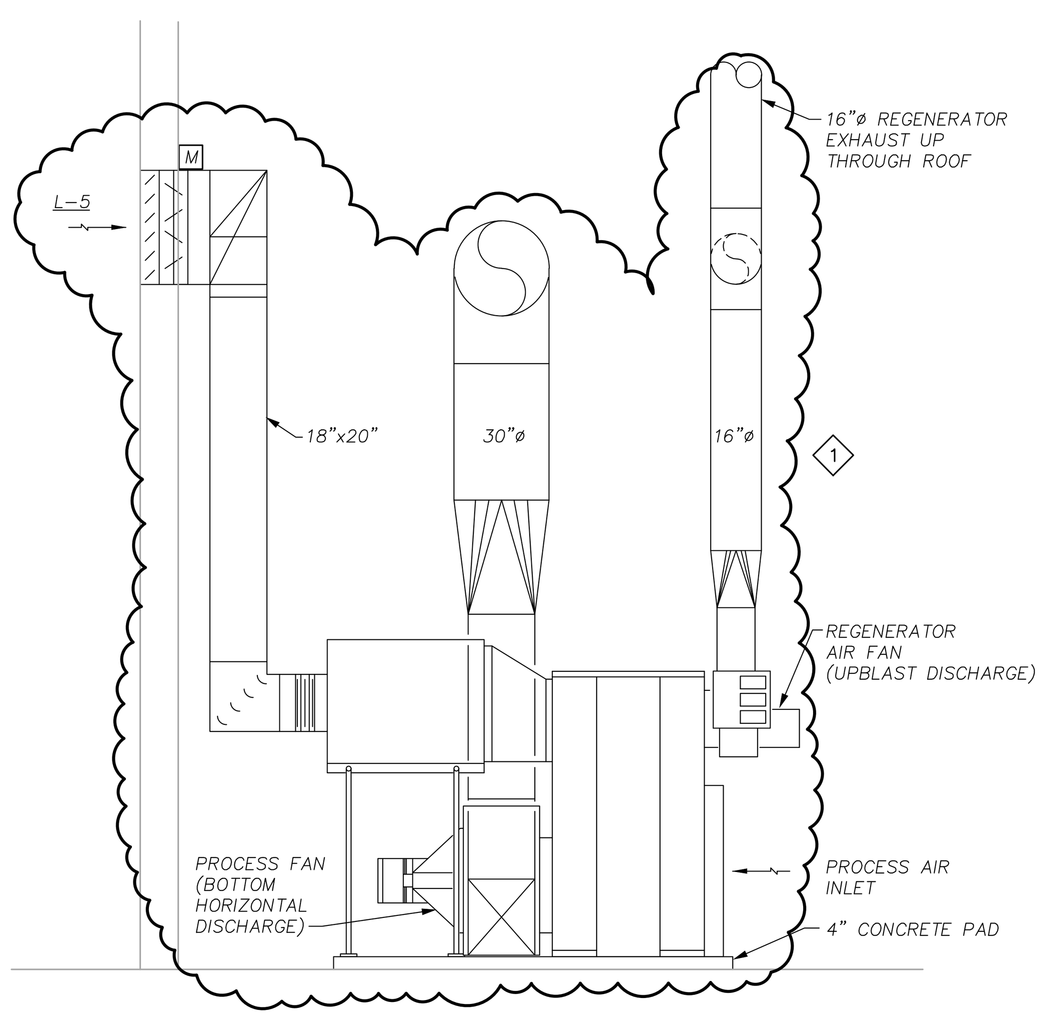
KEY NOTES

1. DEMOLISH CENTRAL DEHUMIDIFIER SYSTEM INCLUDING DH-1 AND ASSOCIATED VENTING. PORTABLE DEHUMIDIFICATION SYSTEMS WILL BE INSTALLED IN THE PLANT AS NECESSARY.
2. REPLACE THE EXISTING BOILERS B-1 AND B-2.
3. REPLACE AHU-2.
4. REPLACE AHU-3.



AIR HANDLING UNIT 2 DETAIL

SCALE: 1/4" = 1'-0"



DEHUMIDIFER DETAIL

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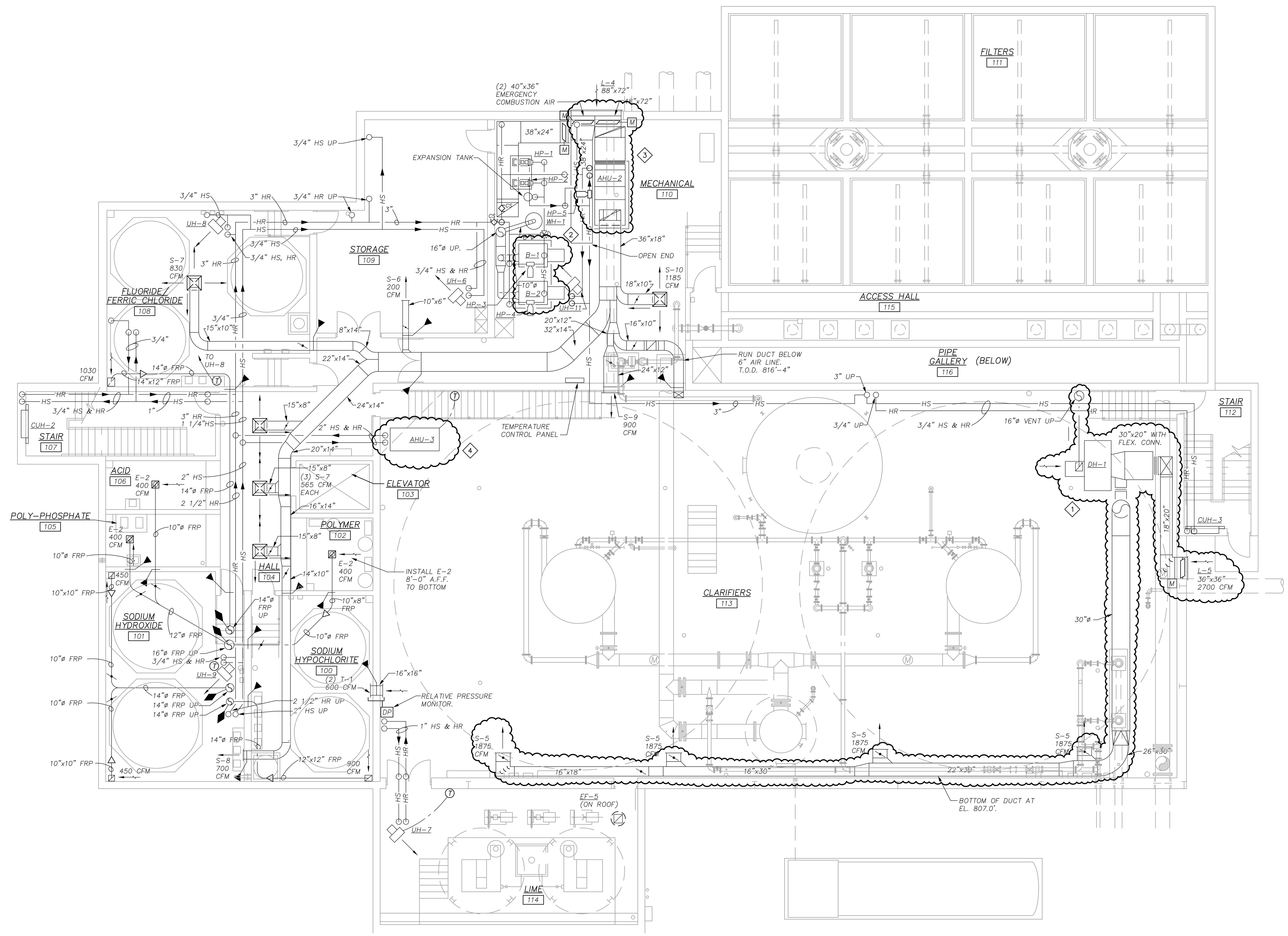

NORTH

LOWER/INTERMEDIATE LEVEL

HVAC/PIPING PLAN

SCALE: 1/8" = 1'-0"

PLOT INFO: Z:\2023\230532\CAD_FIGURES\FIGURE_9-10.DWG LAYOUT: FIGURE 9 DATE: 4/14/2023 TIME: 1:44:42 PM USER: ZGOGULSKI

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Manager	BWV

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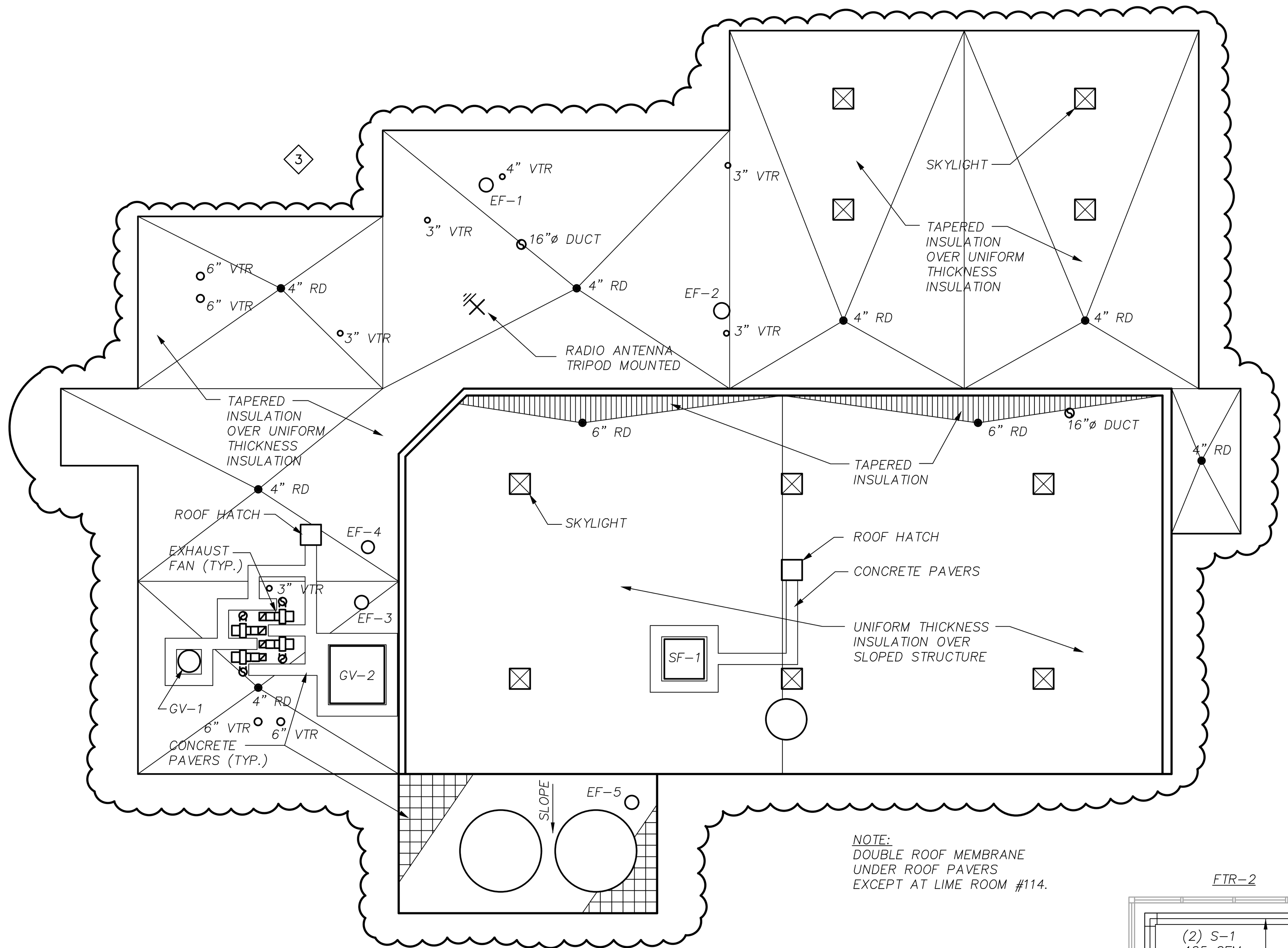
PROJECT NO.

230532

FIGURE NO.

9

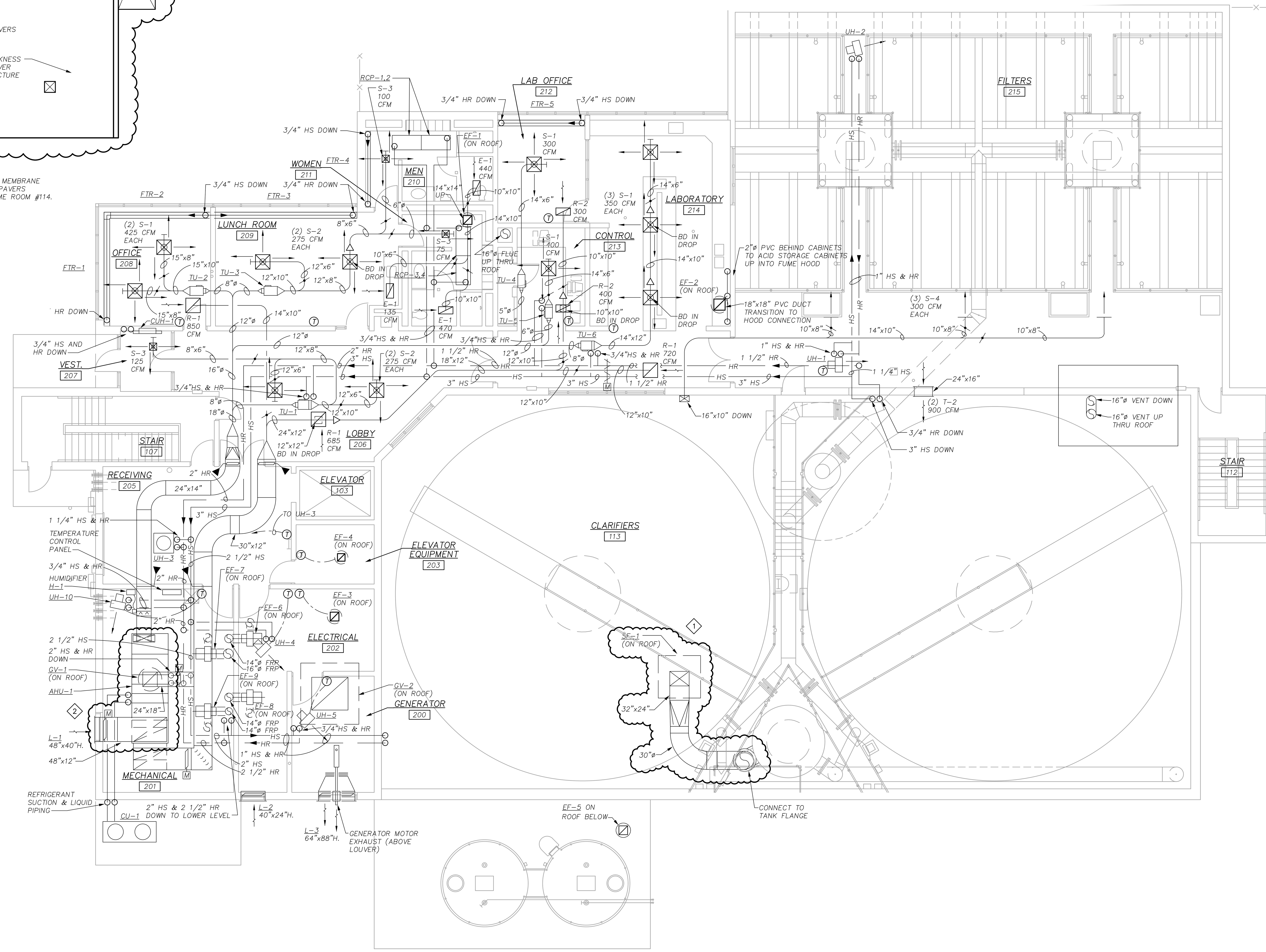


NOTE:
DOUBLE ROOF MEMBRANE UNDER ROOF PAVERS EXCEPT AT LIME ROOM #114.

ROOF PLAN

SCALE: 1/16" = 1'-0"

NORTH



LOWER/INTERMEDIATE LEVEL

HVAC/PIPING PLAN

SCALE: 1/8" = 1'-0"

NORTH

LEGEND

PROPOSED AREA OF WORK

KEY NOTES

1. REPLACE EXISTING AERATOR SUPPLY FAN SF-1 AND ASSOCIATED DUCTWORK.
2. REPLACE AH-1.
3. REPLACE THE ROOF.

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Planning Document

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Designer MBK
Reviewer
Manager BWV

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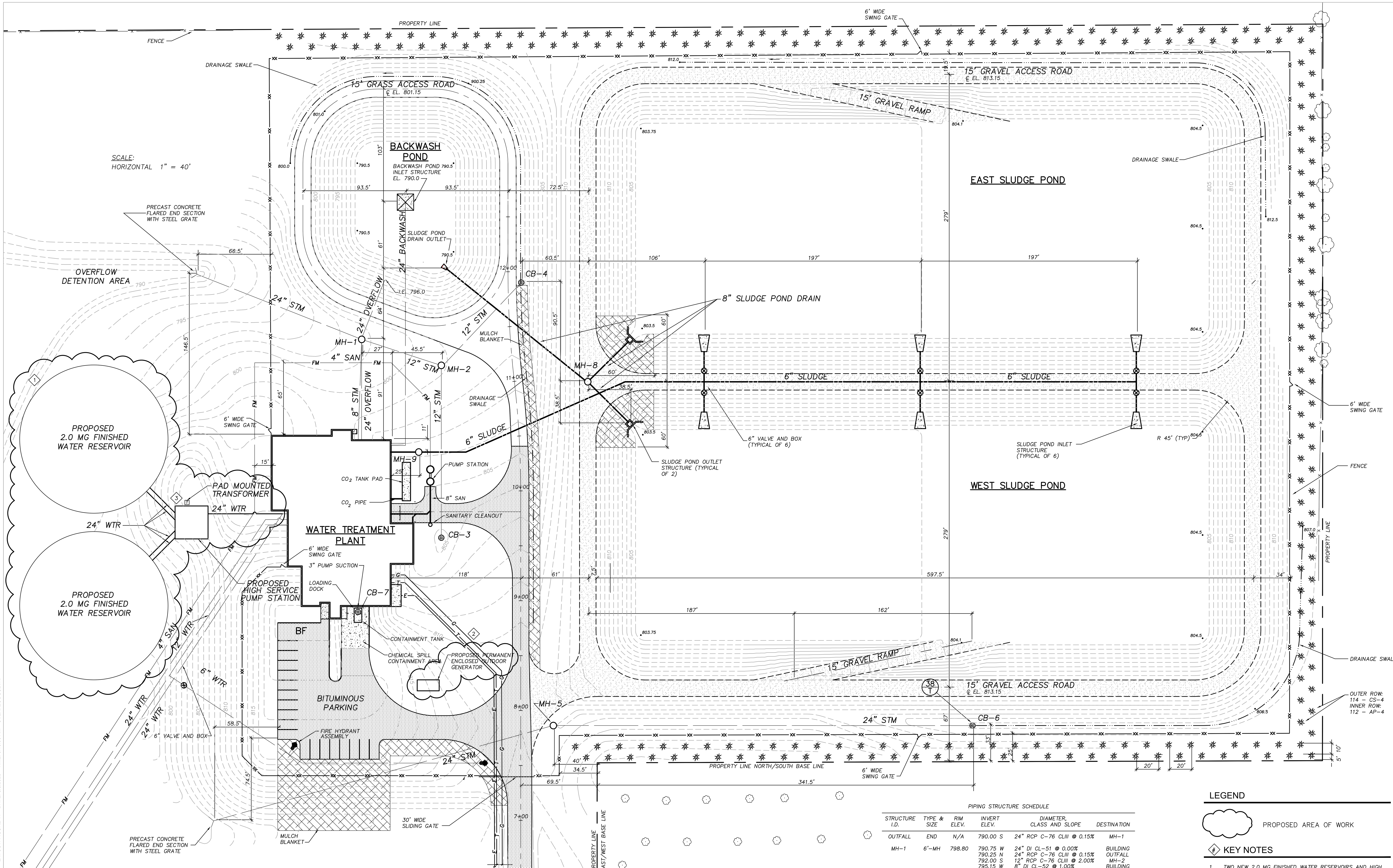
PROJECT NO.
230532

FIGURE NO.
10

PLOT INFO: Z:\2023\230532\CAD_FIGURES\FIGURE_9-10.DWG LAYOUT: FIGURE 10 DATE: 4/14/2023 TIME: 1:45:15 PM USER: ZGOGULSKI



PIPING STRUCTURE SCHEDULE

STRUCTURE I.D.	TYPE & SIZE	RIM ELEV.	INVERT ELEV.	DIAMETER, CLASS AND SLOPE	DESTINATION
OUTFALL	END	N/A	800.30 N	24" RCP C-76 CLIII @ 0.37%	MH-5
CB-7	TANK	815.25	806.00 E	3" PVC SCH-80 PUMP SUCTION	BUILDING
BACKWASH POND	END	N/A	796.00 E	24" DI CL-51 @ 3.6%	MH-1
MH-8	4'-MH	813.15	794.70 SE 794.70 SW 794.60 NE	8" DI CL-51 @ 2.6% 8" DI CL-51 @ 2.6% 8" DI CL-51 @ 2.6%	SLUDGE POND SLUDGE POND BACKWASH POND
MH-9	6'-MH 6'-MH	803.80 803.80	799.00 N 799.00 S	6" DI CL-51 6" DI CL-51	SLUDGE POND SLUDGE POND

PIPING STRUCTURE SCHEDULE

STRUCTURE I.D.	TYPE & SIZE	RIM ELEV.	INVERT ELEV.	DIAMETER, CLASS AND SLOPE	DESTINATION
OUTFALL	END	N/A	790.00 S	24" RCP C-76 CLIII @ 0.15%	MH-1
MH-1	6'-MH	798.80	790.75 W 790.25 N 792.00 S 795.15 W 794.00 E	24" DI CL-51 @ 0.00% 24" RCP C-76 CLIII @ 0.15% 12" RCP C-76 CLIII @ 2.00% 8" DI CL-52 @ 1.00% 24" DI CL-51 @ 3.6%	BUILDING OUTFALL MH-2 BUILDING BACKWASH POND
MH-2	4'-MH	800.9	793.54 N 793.92 S 796.40 W	12" RCP C-76 CLIII @ 2.00% 12" RCP C-76 CLIII @ 2.00% 12" RCP C-76 CLIII @ 2.00%	MH-1 CB-4 CB-3
CB-3	4'-CB	804.50	799.50 E	12" RCP C-76 CLIII @ 2.00%	MH-2
CB-4	4'-CB	800.50	796.00 N	12" RCP C-76 CLIII @ 2.00%	MH-2
MH-5	5'-MH	810.50	801.59 S 801.50 N	24" RCP C-76 CLIII @ 0.37% 24" RCP C-76 CLIII @ 0.37%	CB-6 OUTFALL
CB-6	4'-CB	806.00	803.00 N	24" RCP C-76 CLIII @ 0.37%	MH-5

PROPERTY LINES BASED ON SURVEY BY
WILLIAM B. RUDDELL, P.E., R.L.S.
DATED 4/20/93

LEGEND

PROPOSED AREA OF WORK

KEY NOTES

1. TWO NEW 2.0 MG FINISHED WATER RESERVOIRS AND HIGH SERVICE PUMP STATION.
2. INSTALL NEW PERMANENT ONSITE GENERATOR WITH OUTDOOR ENCLOSURE.
3. NEW PAD MOUNTED TRANSFORMER FOR THE HIGH SERVICE PUMP STATION.

NORTH

WTP SITE IMPROVEMENTS

SCALE: 1" = 40'
0 10 20 40

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City of Mount Pleasant
Isabella County, Michigan
Drinking Water State Revolving Fund (DWSRF)
Planning Document

REVISIONS

NOT FOR CONSTRUCTION

Drawn By	ZAG
Designer	MBK
Reviewer	
Manager	BWV

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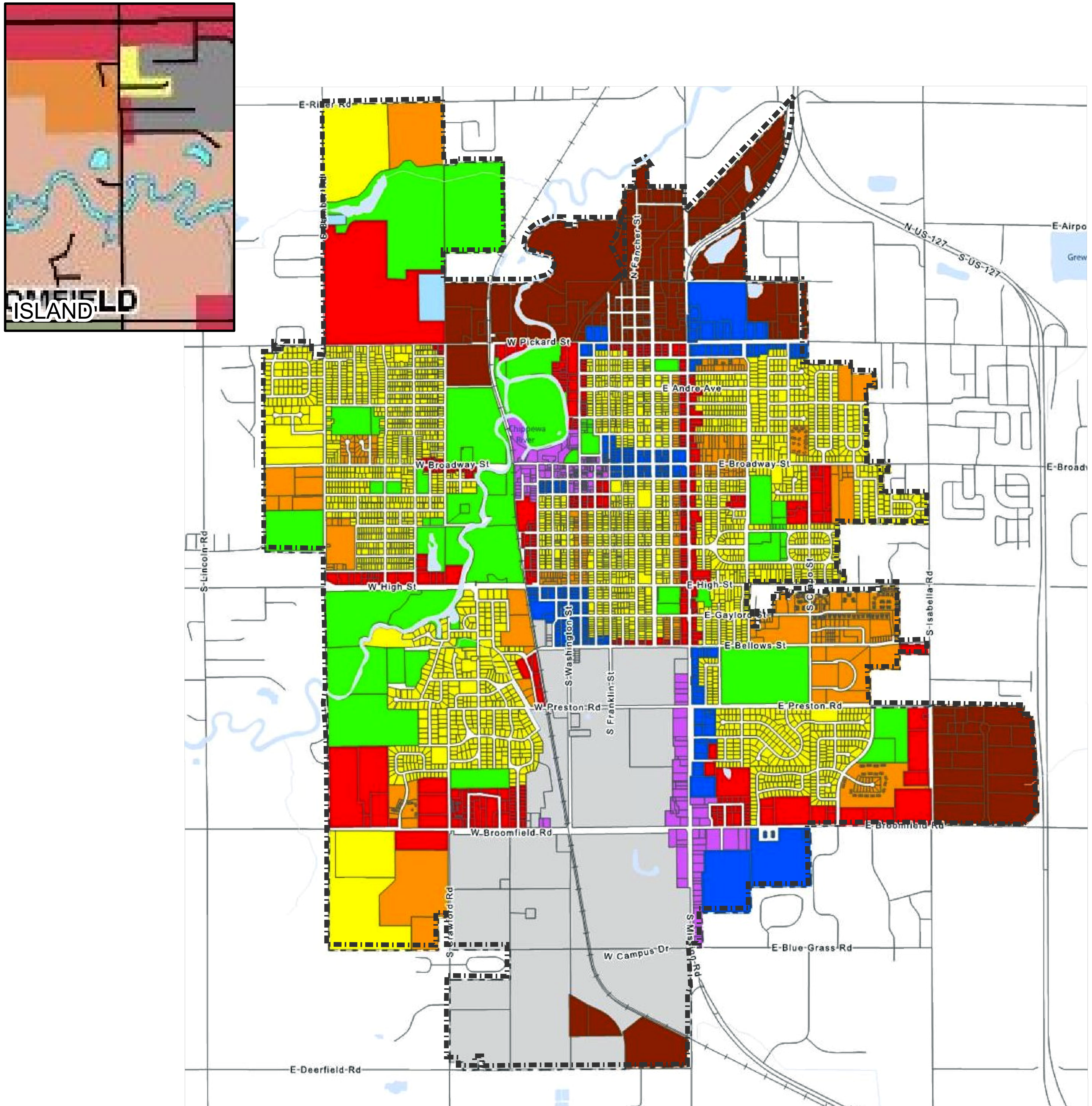
PROJECT NO.
230532

FIGURE NO.
11

PLOT INFO: Z:\2023\230532\CAD_FIGURES\FIGURE_11.DWG LAYOUT: FIGURE 11 DATE: 5/8/2023 TIME: 9:18:06 AM USER: ZGOGULSKI

Maps



LEGEND

- Township and City Boundaries
- Roads
- Railroads
- Rivers, streams, and lakes

Proposed Future Land Use

- Parks/Public
- Residential
- Attached Residential
- Mixed Use Low
- Mixed Use Medium
- Mixed Use High
- Industrial
- Campus
- Tribal Land

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City of Mt. Pleasant

Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

NORTH

FUTURE LAND USE

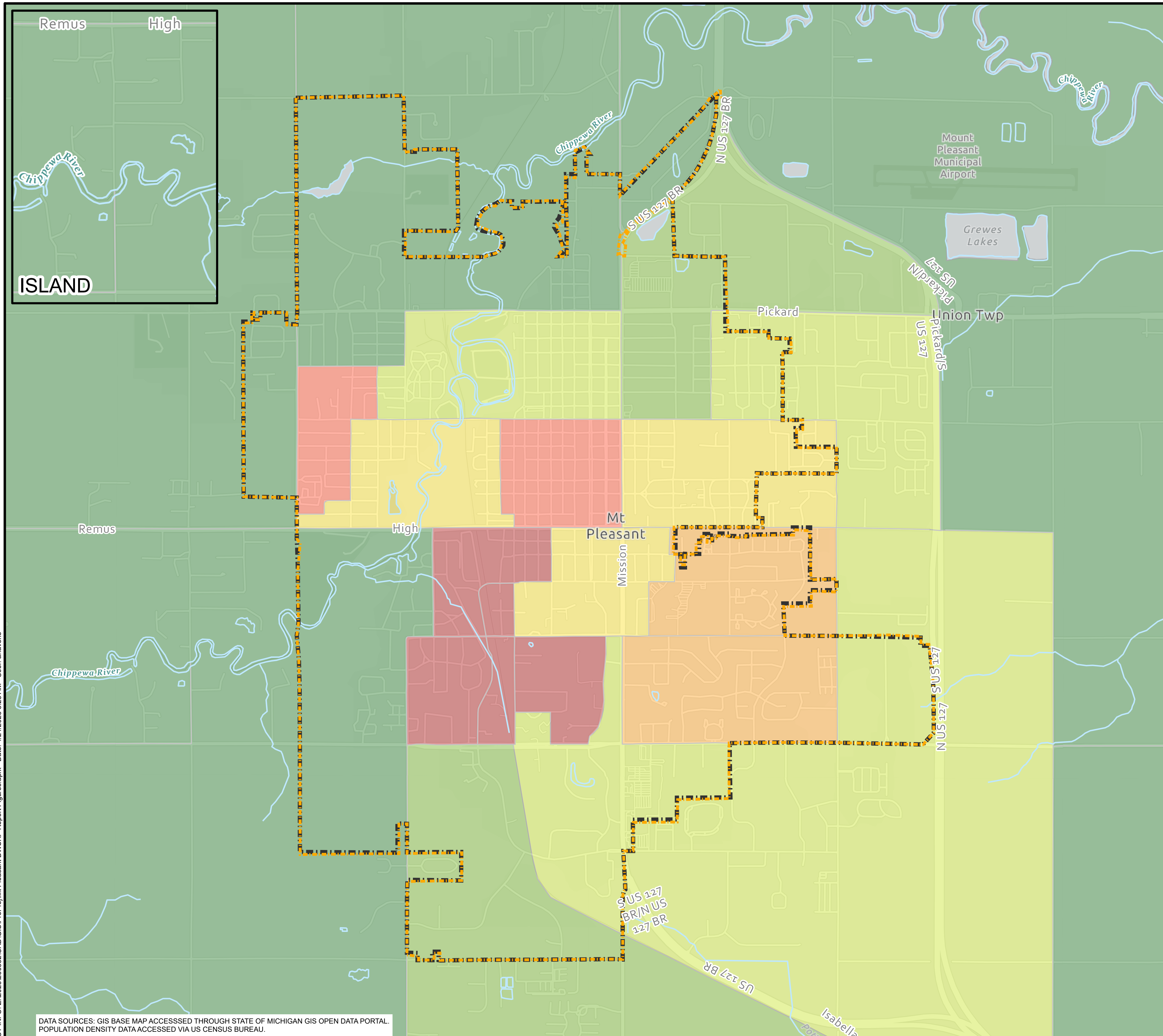
FEET
0 1,250 2,500

PROJECT NO.
230532

MAP NO.
1

DATA SOURCES: CITY OF MT. PLEASANT MASTER PLAN (2020).

PLOT INFO: Z:\2023\230532\CAD\GIS\ProProj\Mt Pleasant DWSRF Report Figures.aprx Date: 4/21/2023 11:09 AM User: ahavens



LEGEND

2019 Population Density (People per Square Mile)

- 0 - 1,000 People per sq mi
- 1,000 - 2,000 People per sq mi
- 2,000 - 3,000 People per sq mi
- 3,000 - 4,000 People per sq mi
- 4,000 - 5,000 People per sq mi
- 5,000 - 6,000 People per sq mi
- 6,000+ People per sq mi
- Water System Service Area
- City Limit

NORTH

POPULATION DENSITY

0 1,250 2,500 FEET

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City of Mt. Pleasant

Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

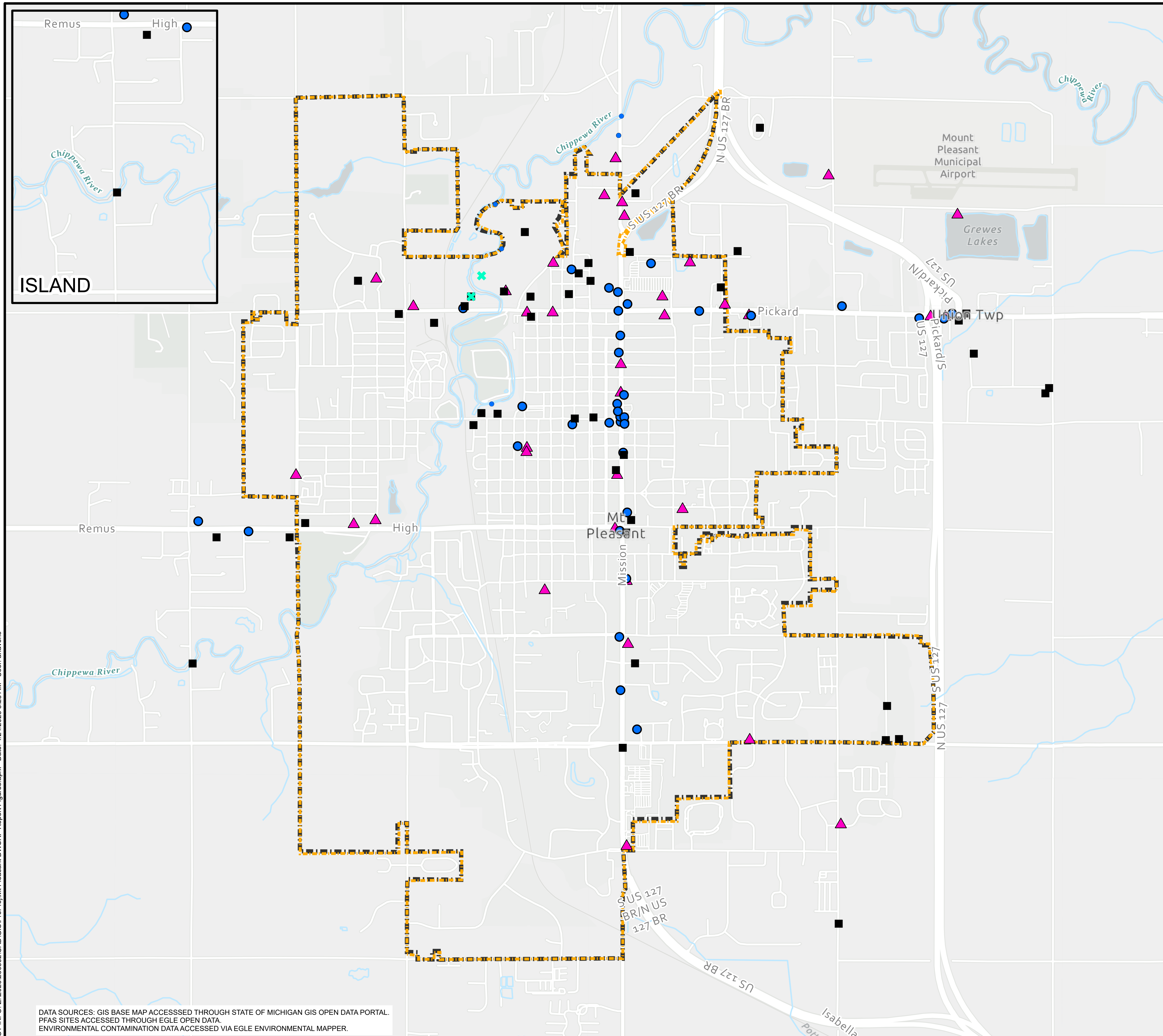
PROJECT NO.

230532

MAP NO.

2

PLOT INFO: Z:\2023\230532\CAD\GIS\ProProj\Mt Pleasant DWSRF Report Figures.aprx Date: 4/24/2023 8:23 AM User: ahavens



DATA SOURCES: GIS BASE MAP ACCESSSED THROUGH STATE OF MICHIGAN GIS OPEN DATA PORTAL.
PFAS SITES ACCESSED THROUGH EGLE OPEN DATA.
ENVIRONMENTAL CONTAMINATION DATA ACCESSED VIA EGLE ENVIRONMENTAL MAPPER.

ENVIRONMENTAL CONTAMINATION: MT. PLEASANT

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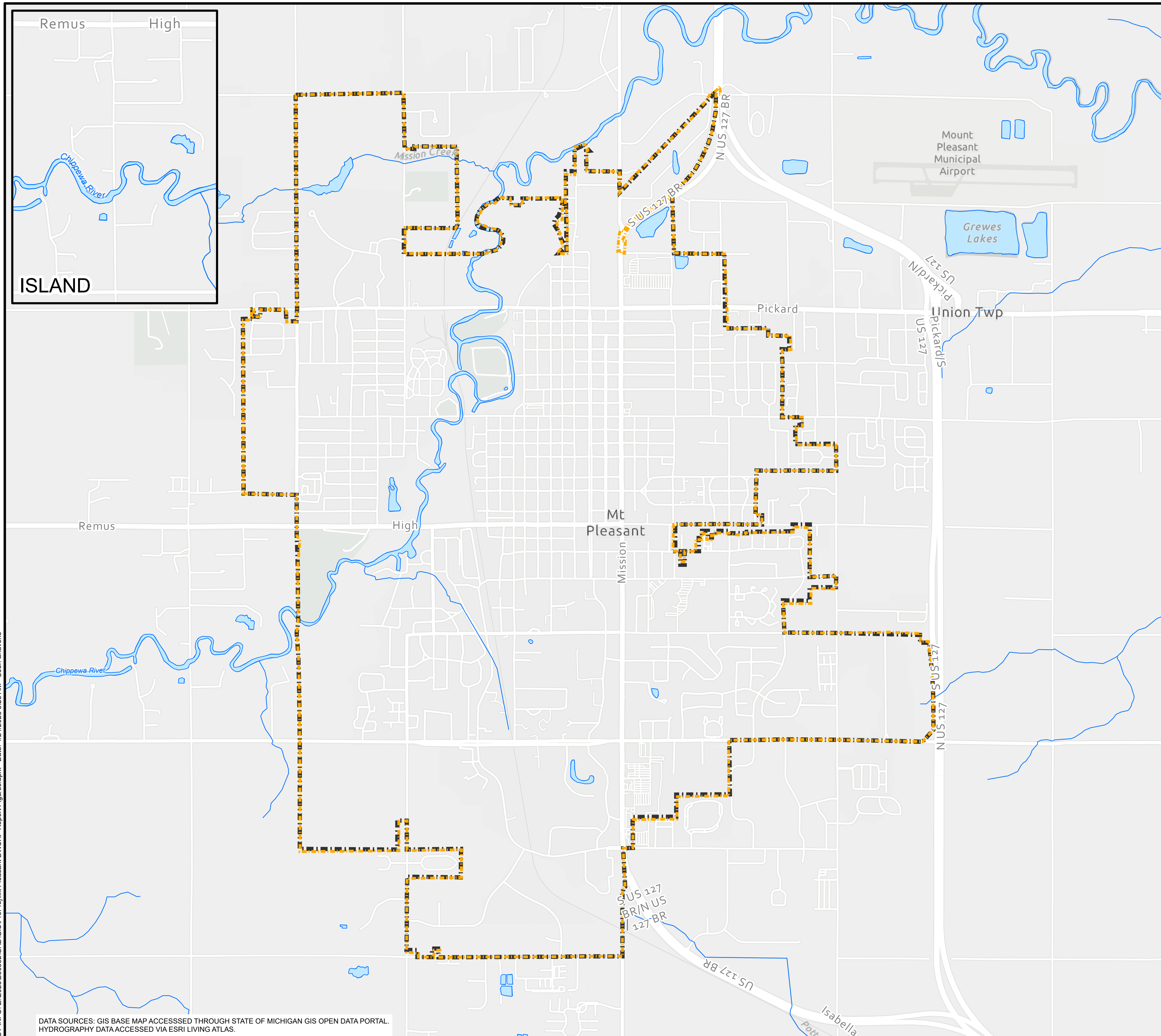
City of Mt. Pleasant
Isabella County, Michigan
Clean Water State Revolving Fund (CWSRF) Project Plan

PROJECT NO.
211228

MAP NO.
3

PLOT INFO: Z:\2023\230532\CAD\GIS\ProPro\Mt Pleasant DWSRF Report Figures.aprx Date: 4/24/2023 8:23 AM User: ahavens



LEGEND

- Watercourse
- Lakes/Ponds
- Water System Service Area
- City Limit

MAJOR SURFACE WATERS

NORTH

0 1,250 2,500 FEET

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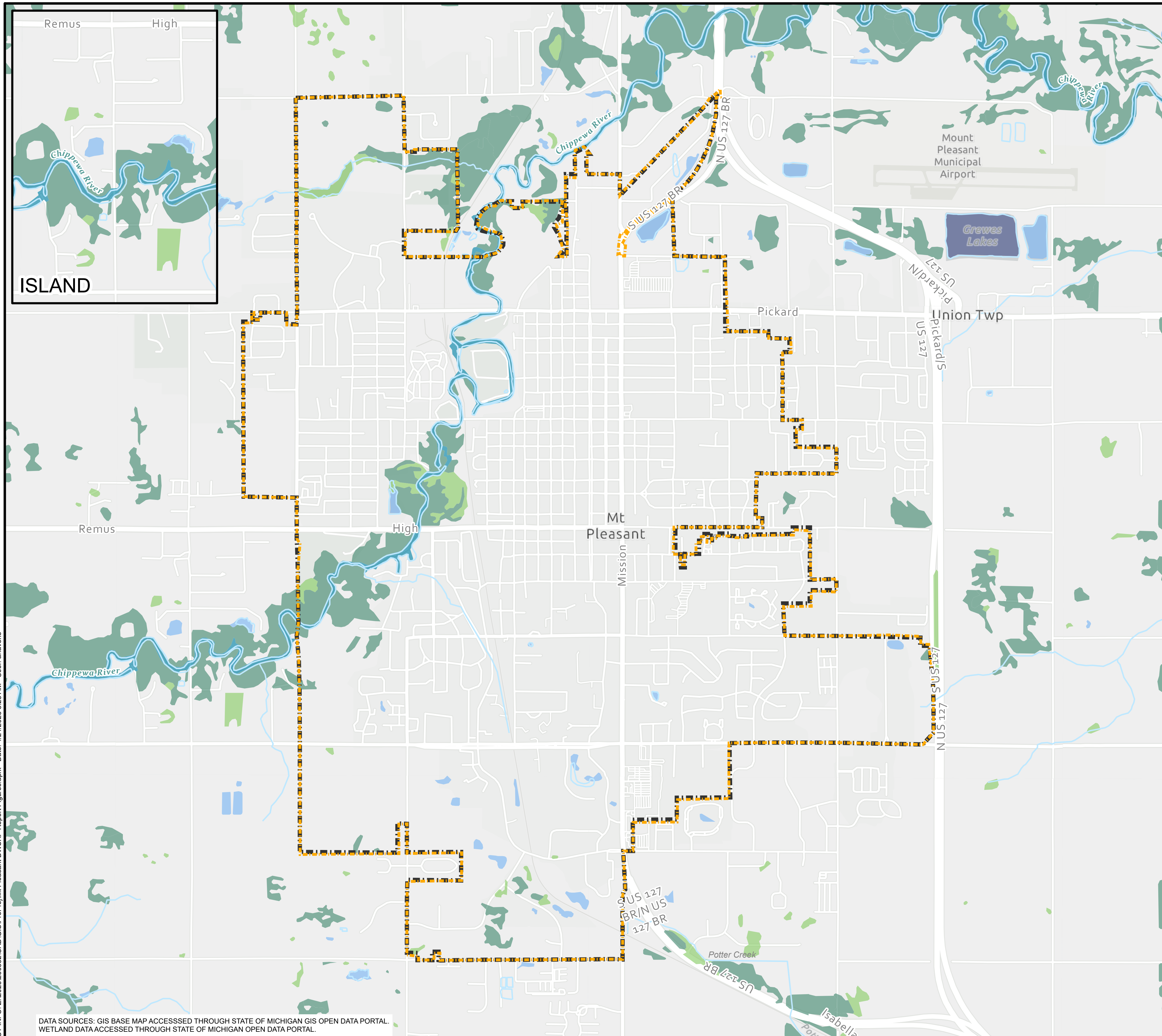
City of Mt. Pleasant
Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

PROJECT NO.
230532

MAP NO.
4

PLOT INFO: Z:\2023\230532\CAD\GIS\ProPro\Mt Pleasant DWSRF Report Figures.aprx Date: 4/24/2023 8:23 AM User: ahavens



DATA SOURCES: GIS BASE MAP ACCESSSED THROUGH STATE OF MICHIGAN GIS OPEN DATA PORTAL.
WETLAND DATA ACCESSED THROUGH STATE OF MICHIGAN OPEN DATA PORTAL.

LEGEND

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine
- Water System Service Area
- City Limit
- Rivers and Streams

NORTH

0 1,250 2,500 FEET

WETLANDS AND MAJOR SURFACE WATERS

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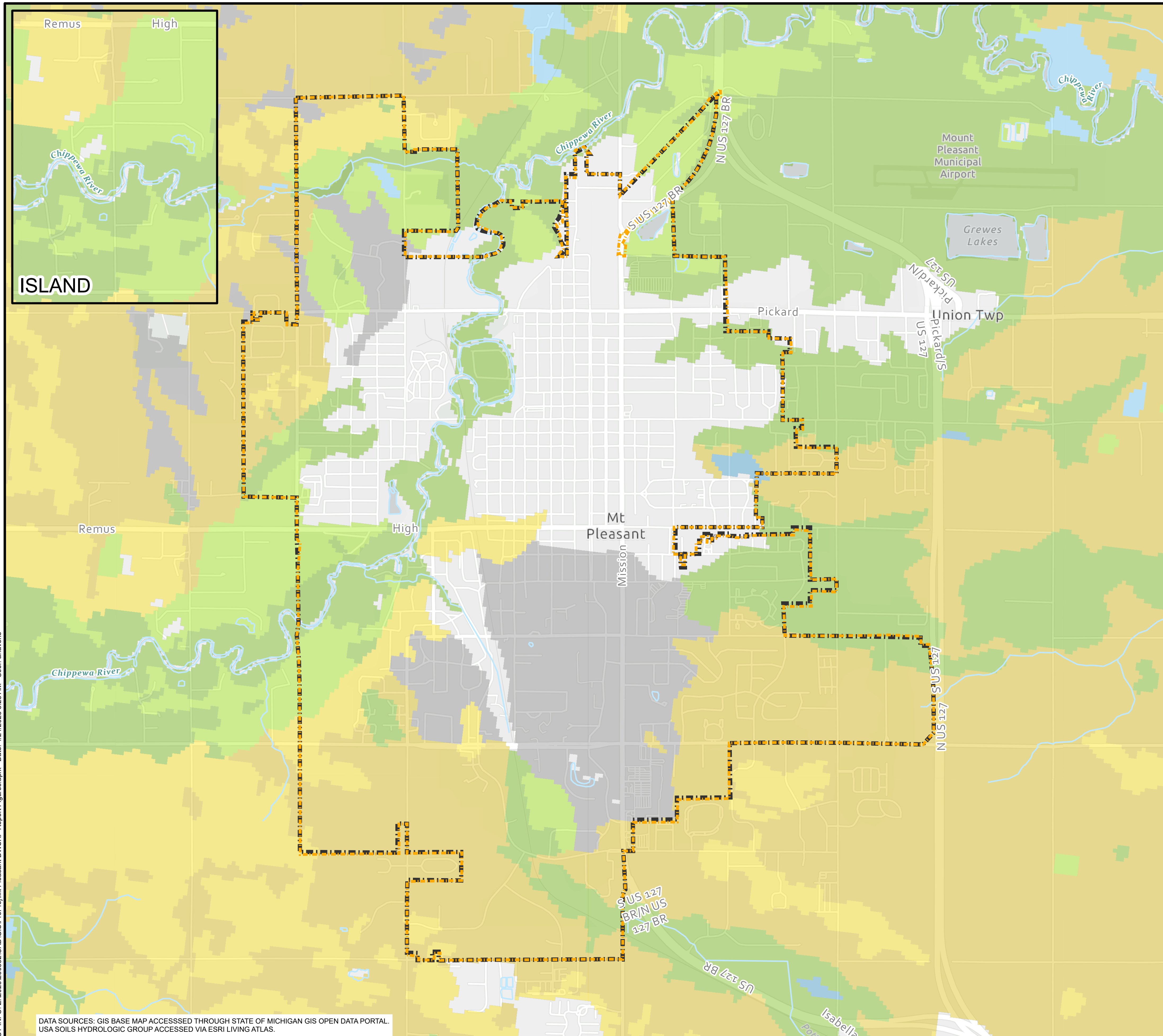
City of Mt. Pleasant
Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

PROJECT NO.
230532

MAP NO.
5

PLOT INFO: Z:\2023\230532\CAD\GIS\ProProj\Mt Pleasant DWSRF Report Figures.aprx Date: 4/24/2023 8:23 AM User: ahavens



DATA SOURCES: GIS BASE MAP ACCESSSED THROUGH STATE OF MICHIGAN GIS OPEN DATA PORTAL.
USA SOILS HYDROLOGIC GROUP ACCESSED VIA ESRI LIVING ATLAS.

LEGEND

USA Soils Hydrologic Group

- Group A
- Group B
- Group C
- Group D
- Group A/D
- Group B/D
- Group C/D
- Water System Service Area
- City Limit

NORTH

SOILS

0 1,250 2,500 FEET

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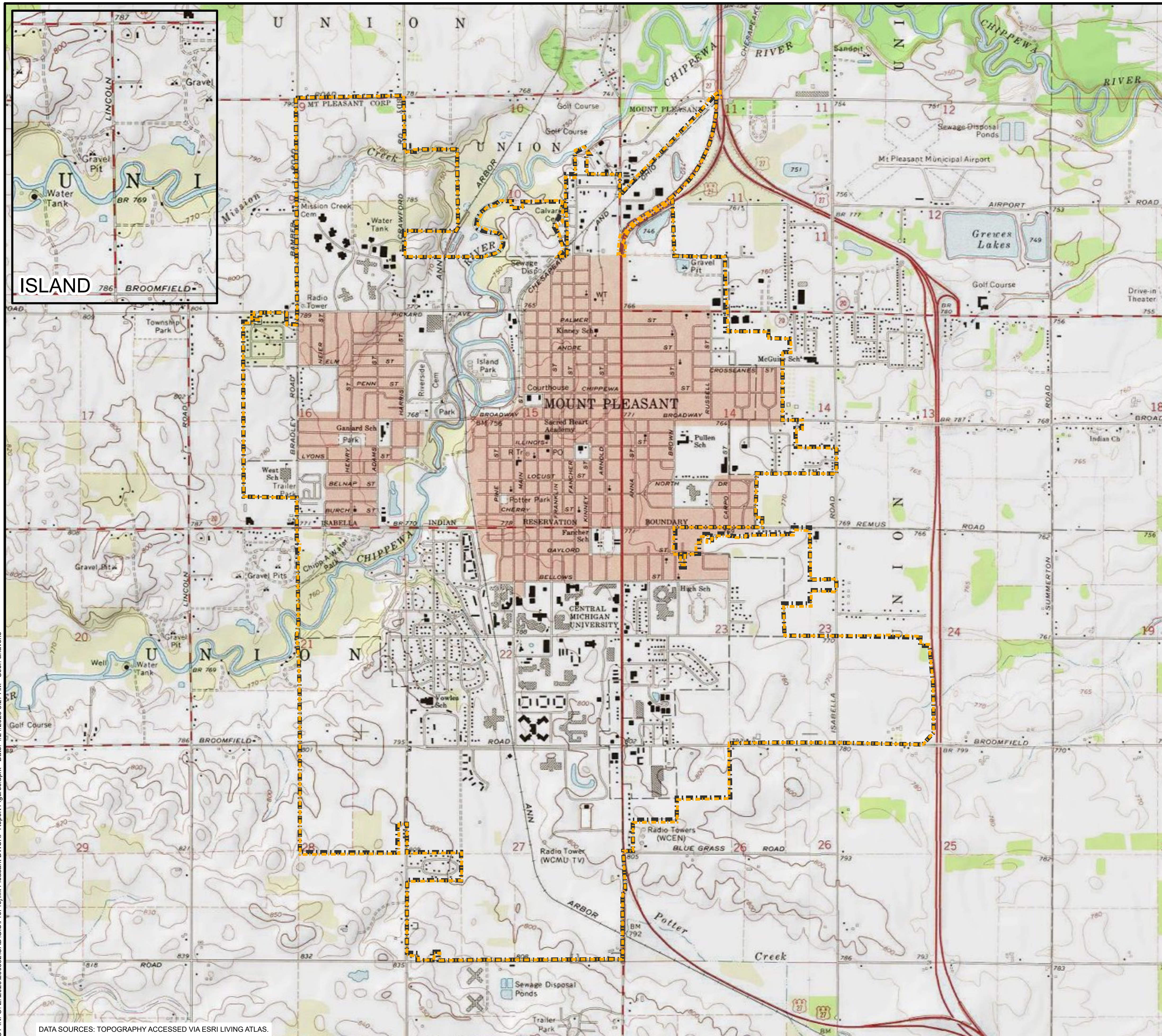
City of Mt. Pleasant
Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

PROJECT NO.
230532

MAP NO.
6

PLOT INFO: Z:\2023\230532\CAD\GIS\ProProj\Mt Pleasant DWSRF Report Figures.aprx Date: 4/24/2023 8:23 AM User: ahavens



LEGEND

- Water System Service Area
- City Limit

TOPOGRAPHY

NORTH

0 1,250 2,500 FEET

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City of Mt. Pleasant

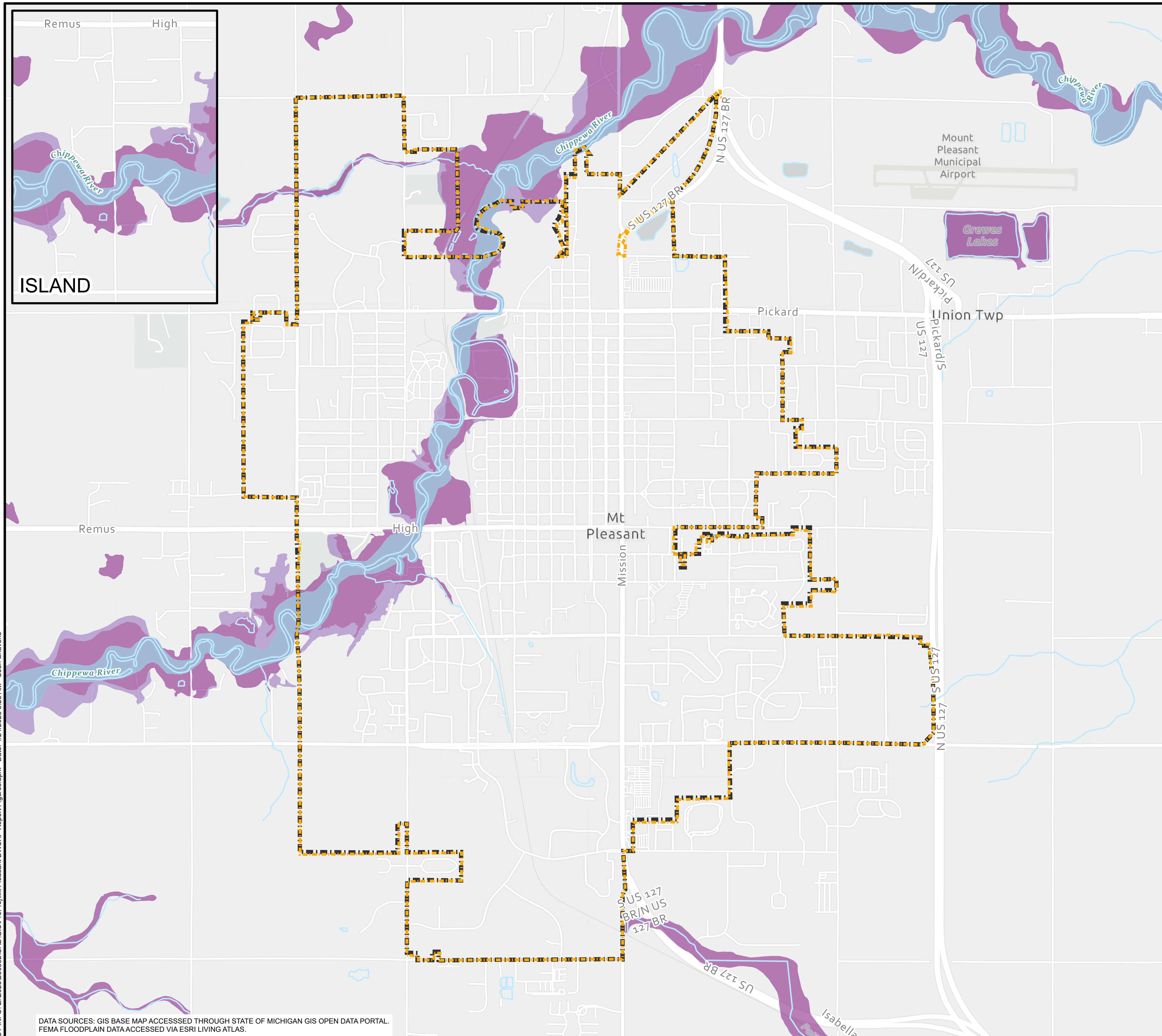
Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

PROJECT NO.
230532

MAP NO.
7

PLOT INFO: Z:\2023\230532\CAD\GIS\ProProj\Mt Pleasant DWSRF Report Figures.aprx Date: 4/24/2023 8:27 AM User: ahavens



DATA SOURCES: GIS BASE MAP ACCESSSED THROUGH STATE OF MICHIGAN GIS OPEN DATA PORTAL.
FEMA FLOODPLAIN DATA ACCESSED VIA ESRI LIVING ATLAS.

LEGEND

- 1% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Regulatory Floodway
- Water System Service Area
- City Limit

NORTH

FEMA FLOODPLAIN

0 1,250 2,500 FEET

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City of Mt. Pleasant
Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

PROJECT NO.
230532

MAP NO.
8

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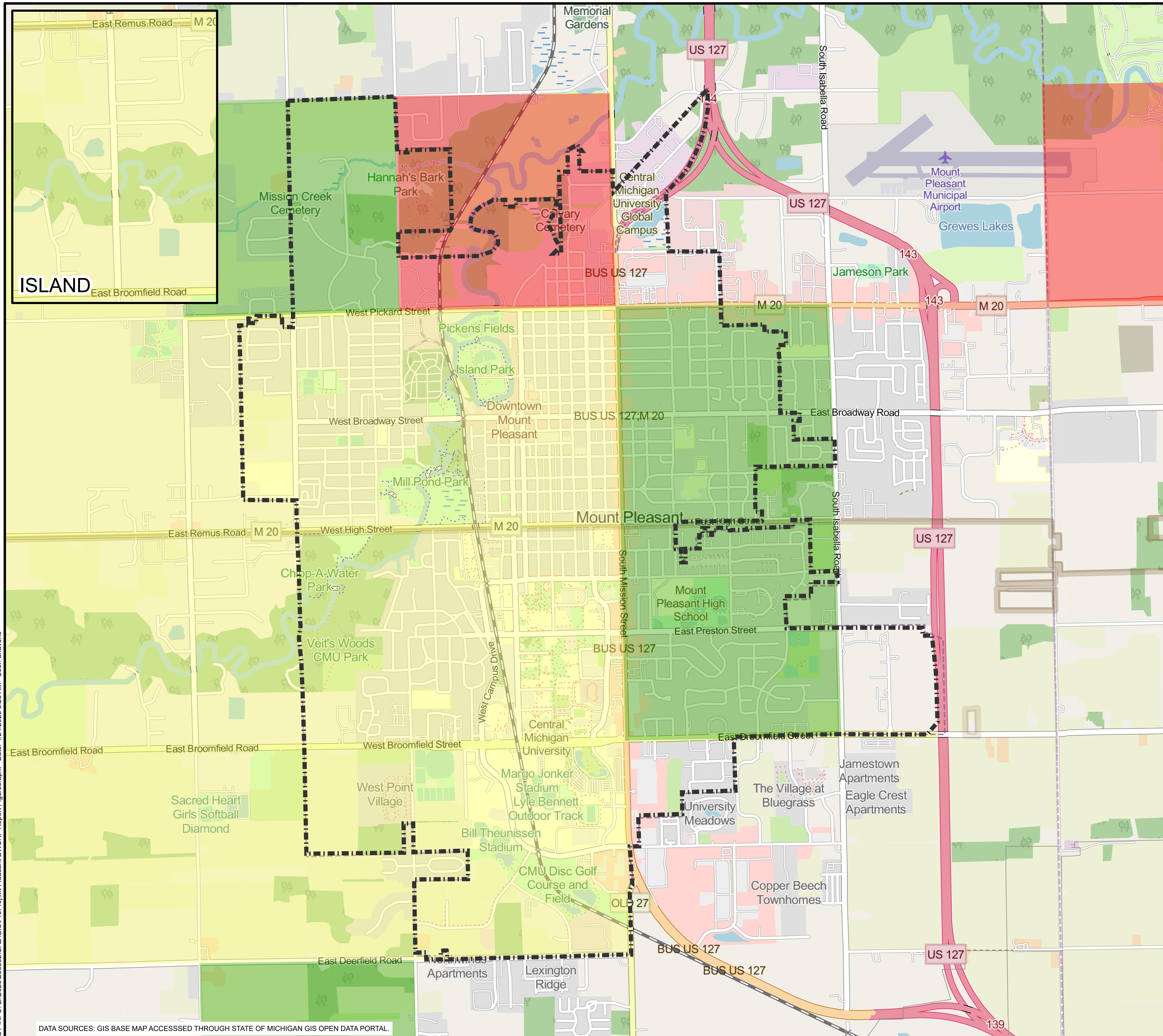

LEGEND

Likelihood of Threatened, Endangered, or Special Concern Species

- High Likelihood
- Moderate Likelihood
- Low Likelihood
- City Limit

NORTH

NATURAL FEATURES INVENTORY

0 1,250 2,500 FEET

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City of Mt. Pleasant

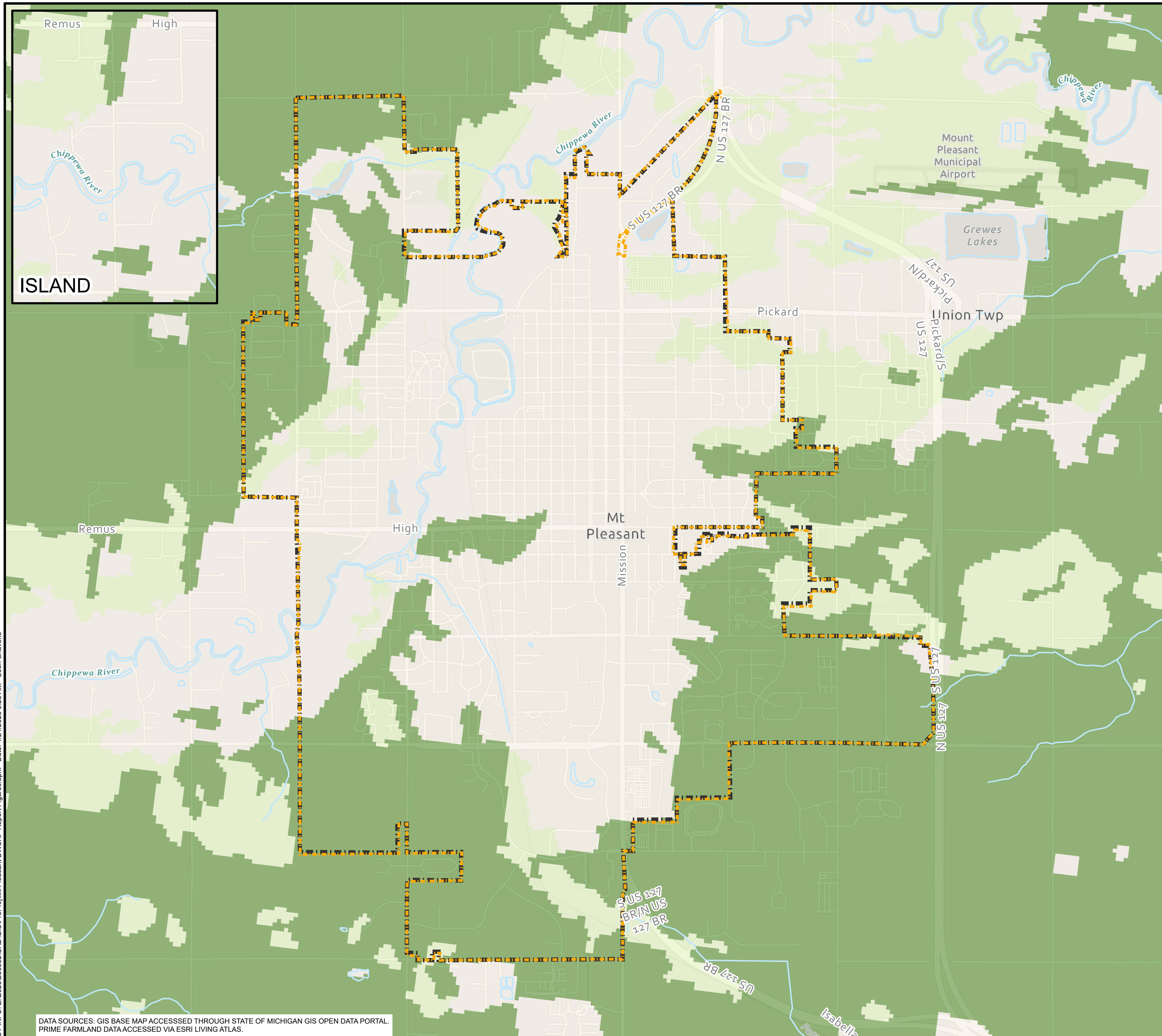
Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

PROJECT NO.
230532

MAP NO.
9

PLOT INFO: Z:\2023\230532\CAD\GIS\ProProj\Mt Pleasant DWSRF Report Figures.aprx Date: 4/24/2023 8:28 AM User: ahavens



DATA SOURCES: GIS BASE MAP ACCESSSED THROUGH STATE OF MICHIGAN GIS OPEN DATA PORTAL.
PRIME FARMLAND DATA ACCESSED VIA ESRI LIVING ATLAS.

LEGEND

- Prime Farmland
- Farmland of Local Importance
- Not Prime Farmland
- Water System Service Area
- City Limit

NORTH

PRIME FARMLAND

0 1,250 2,500 FEET

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City of Mt. Pleasant
Isabella County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

PROJECT NO.
230532

MAP NO.
10

PLOT INFO: Z:\2023\230532\CAD\GIS\ProProj\Mt Pleasant DWSRF Report Figures.aprx Date: 4/24/2023 8:28 AM User: ahavens

Appendix 1

Mount Pleasant DWSRF Monetary Evaluation
Island Improvements
Project No. 230532

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost	
Ranney Well Collector	LS	1	$1,990,000	$1,990,000	
Ranney Well Building & Valve Vault Electrical	LS	1	$883,000	$883,000	
Ranney Well Pump Motor Replacements	LS	1	$54,000	$54,000	
Subtotal				$2,927,000	
Contractor General Conditions, Overhead and Profit (15%)				$440,000	15%
Contingency (20%)				$590,000	20%
Engineering/Administration/Legal (22%)				$800,000	20%
Total Estimated Project Cost				$4,760,000	

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
Ranney Well Collector	$1,990,000	50	$0	$1,200,000
Ranney Well Building & Valve Vault Electrical	$883,000	30	$0	$300,000
Ranney Well Pump Motor Replacements	$54,000	30	$0	$20,000
Subtotal	$2,927,000			$1,520,000
Contractor General Conditions, Overhead and Profit (15%)	$440,000			
Contingency (20%)	$590,000			
Engineering/Administration/Legal (22%)	$800,000			
Total Estimated Project Cost	$4,760,000			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$4,760,000	$4,760,000
Annual O&M Cost	$2,000	$40,000
Salvage Value	$1,520,000	($1,410,000)
Total Estimate of Present Worth		$3,390,000

Notes:
Present Worth estimated using discount rate of 0.4% *from EGLE*

No Action

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$0	$0
Annual O&M Cost	$50,000	$960,000
Salvage Value	$0	$0
Total Estimate of Present Worth		$960,000

Notes:
Present Worth estimated using discount rate of 0.4% *from EGLE*

Mount Pleasant DWSRF Monetary Evaluation
Water Treatment Plant Improvements
Project No. 230532

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost	
Clarifier Valves	LS	1	$54,000	$54,000	
Filter Improvements	LS	1	$843,000	$843,000	
Recarbonation Tank Improvements	LS	1	$122,000	$122,000	
Aerator Improvements	LS	1	$2,053,000	$2,053,000	
WTP Roof Improvements	LS	1	$495,000	$495,000	
Chemical Tank Replacement	LS	1	$615,000	$615,000	
WTP Electrical Improvements	LS	1	$830,000	$830,000	
HVAC - Boilers, Dehumidifiers, Air Handling Units	LS	1	$383,000	$383,000	
Process Flow Meter Replacements	LS	1	$156,000	$156,000	
SCADA Upgrades	LS	1	$1,100,000	$1,100,000	
Subtotal				$6,651,000	
Contractor General Conditions, Overhead, and Profit (15%)				$998,000	15%
Contingency (20%)				$1,331,000	20%
Engineering/Administration/Legal (22%)				$1,800,000	20%
Total Estimated Project Cost				**$10,780,000**	

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
Clarifier Valves	$54,000	25	$0	$11,000
Filter Improvements	$843,000	25	$0	$169,000
Recarbonation Tank Improvements	$122,000	25	$0	$25,000
Aerator Imporvements	$2,053,000	25	$0	$411,000
WTP Roof Improvements	$495,000	30	$0	$165,000
Chemical Tank Replacement	$615,000	25	$0	$123,000
WTP Electrical Improvements	$830,000	30	$0	$277,000
HVAC - Boilers and Dehumidifiers	$383,000	25	$0	$77,000
Process Flow Meter Replacements	$156,000	20	$0	$0
SCADA Upgrades	$1,100,000	25	$0	$220,000
Subtotal	$6,651,000			$1,478,000
Contractor General Conditions, Overhead, and Profit (15%)	$998,000			
Contingency (20%)	$1,331,000			
Engineering/Administration/Legal (22%)	$1,800,000			
Total Estimated Project Cost	**$10,780,000**			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$10,780,000	$10,780,000
Annual O&M Cost	$160,000	$3,069,500
Salvage Value	$1,478,000	($1,370,000)
Total Estimate of Present Worth		**$12,480,000**

Notes:
Present Worth estimated using discount rate of 0.4% *from EGLE*

No Action

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$0	$0
Annual O&M Cost	$500,000	$9,592,000
Salvage Value	$0	$0
Total Estimate of Present Worth		**$9,590,000**

Notes:
Present Worth estimated using discount rate of 0.4% *from EGLE*

Mt Pleasant DWSRF Monetary Evaluation
Lime Sludge System Improvements
Project No. 230532

Alternative 1

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost	
N/A					
Subtotal				$0	
Contractor General Conditions, Overhead, and Profit (15%)				$0	15%
Contingency (20%)				$0	20%
Engineering/Administration/Legal (22%)				$0	22%
Total Estimated Project Cost				**$0**	

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
N/A	$0	50	$0	$0
Subtotal	$0			$0
Contractor General Conditions, Overhead, and Profit (15%)	$0			
Contingency (20%)	$0			
Engineering/Administration/Legal (22%)	$0			
Total Estimated Project Cost	**$0**			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$0	$0
Annual O&M Cost	$437,580	$10,632,043*
Salvage Value	$0	$0
Total Estimate of Present Worth		**$10,632,043**

**Cost includes a 2% annualy compounded*

Notes:

Present Worth estimated using discount rate of 0.4% *from EGLE*

Mt Pleasant DWSRF Monetary Evaluation
Lime Removal System Improvements
Project No. 230532

Alternative 2

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost	
Trucks and Equipment	LS	1	$1,700,000	$1,700,000	
Subtotal				$1,700,000	
Contractor General Conditions, Overhead, and Profit (5%)				$85,000	5%
Contingency (5%)				$85,000	5%
Engineering/Administration/Legal (5%)				$100,000	5%
Total Estimated Project Cost				**$1,970,000**	

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
Trucks and Equipment	$1,700,000	25	$0	$340,000
Subtotal	$1,700,000			$340,000
Contractor General Conditions, Overhead, and Profit (5%)	$85,000			
Contingency (5%)	$85,000			
Engineering/Administration/Legal (22%)	$100,000			
Total Estimated Project Cost	**$1,970,000**			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$1,970,000	$1,970,000
Annual O&M Cost	$228,782	$5,558,799*
Salvage Value	$340,000	($320,000)
Total Estimate of Present Worth		**$7,210,000**

*Cost includes a 2% annualy compounded

Notes:

Present Worth estimated using discount rate of 0.4% *from EGLE*

Mt Pleasant DWSRF Monetary Evaluation
Lime Removal System Improvements
Project No. 230532

Alternative 3

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost	
Screw Press, polymer feed, VFDs/Controls	LS	1	$1,200,000	$1,200,000	
Dewatering Building	LS	1	$1,800,000	$1,800,000	
Site Work	LS	1	$400,000	$400,000	
Subtotal				$3,400,000	
Contractor General Conditions, Overhead, and Profit (15%)				$510,000	15%
Contingency (20%)				$680,000	20%
Engineering/Administration/Legal (22%)				$1,010,000	22%
Total Estimated Project Cost				**$5,600,000**	

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
Screw Press, polymer feed, VFDs/Controls	$1,200,000	50	$0	$720,000
Dewatering Building	$1,800,000	100	0	$1,440,000
Site Work	$400,000	-	0	$0
Subtotal	$3,400,000			$2,160,000
Contractor General Conditions, Overhead, a	$510,000			
Contingency (20%)	$680,000			
Engineering/Administration/Legal (22%)	$1,010,000			
Total Estimated Project Cost	**$5,600,000**			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$5,600,000	$5,600,000
Annual O&M Cost	$240,000	$4,604,200
Salvage Value	$2,160,000	($2,000,000)
Total Estimate of Present Worth		**$8,200,000**

Notes:
Present Worth estimated using discount rat 0.4% *from EGLE*

Mount Pleasant DWSRF Monetary Evaluation
Raw Water Reservoir and Low Lift Pump Station
Project No. 230532

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost	
Site Work	LS	1	$50,000.00	$50,000.00	
Yard Piping and Valves	LS	1	$132,000.00	$132,000.00	
Pump Station Structure	LS	1	$130,000.00	$130,000.00	
Pump Station Process Equipment	LS	1	$510,000.00	$510,000.00	
Reservoir with mixers	LS	1	$1,840,000.00	$1,840,000.00	
Reservoir Piping	LS	1	$25,000.00	$25,000.00	
Mechanical	LS	1	$96,000.00	$96,000.00	
Electrical	LS	1	$400,000.00	$400,000.00	
Instrumentation	LS	1	$15,000.00	$15,000.00	
Subtotal				$3,198,000	
Contractor General Conditions, Overhead, and Profit (15%)				$480,000	15%
Contingency (20%)				$640,000	20%
Engineering/Administration/Legal (22%)				$870,000	20%
Total Estimated Project Cost				**$5,190,000**	

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
Site Work	$50,000	-	$0	$0
Yard Piping and Valves	$132,000	50	$0	$80,000
Pump Station Structure	$130,000	100	$0	$104,000
Pump Station Process Equipment	$510,000	25	$0	$102,000
Reservoir with mixers	$1,840,000	50	$0	$1,104,000
Reservoir Piping	$25,000	50	$0	$15,000
Mechanical	$96,000	30	$0	$32,000
Electrical	$400,000	30	$0	$134,000
Instrumentation	$15,000	20	$0	$0
Subtotal	$3,198,000			$1,571,000
Contractor General Conditions, Overhead, and Profit (15%)	$480,000			
Contingency (20%)	$640,000			
Engineering/Administration/Legal (22%)	$870,000			
Total Estimated Project Cost	**$5,190,000**			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$5,190,000	$5,190,000
Annual O&M Cost	$10,000	$191,800
Salvage Value	$1,571,000	($1,460,000)
Total Estimate of Present Worth		**$3,920,000**

Notes:
Present Worth estimated using discount rate of 0.4% *from EGLE*

Mount Pleasant DWSRF Monetary Evaluation
High Service Pump Station and Finished Water Reservoirs
Project No. 230532

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost	
Site Work	LS	1	$50,000.00	$50,000.00	
Yard Piping and Valves	LS	1	$132,000.00	$132,000.00	
Pump Station Structure	LS	1	$300,000.00	$300,000.00	
Pump Station Process Equipment (Including piping, valves and flowmeter)	LS	1	$1,300,000.00	$1,300,000.00	
Reservoirs with mixers	LS	1	$2,489,000.00	$2,489,000.00	
Reservoir Piping	LS	1	$90,000.00	$90,000.00	
HSP Distribution Transmission Main	LS	1	$450,000.00	$450,000.00	
Mechanical	LS	1	$240,000.00	$240,000.00	
Electrical	LS	1	$500,000.00	$500,000.00	
Instrumentation	LS	1	$48,000.00	$48,000.00	
Subtotal				$5,599,000	
Contractor General Conditions, Overhead, and Profit (15%)				$840,000	15%
Contingency (20%)				$1,120,000	20%
Engineering/Administration/Legal (22%)				$1,520,000	20%
Total Estimated Project Cost				**$9,080,000**	

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
Site Work	$50,000	-	$0	$0
Yard Piping and Valves	$132,000	50	$0	$80,000
Pump Station Structure	$300,000	100	$0	$240,000
Pump Station Process Equipment (Including piping, valves and flowmeter)	$1,300,000	25	$0	$260,000
Reservoirs with mixers	$2,489,000	50	$0	$1,494,000
Reservoir Piping	$90,000	50	$0	$54,000
HSP Distribution Transmission Main	$450,000.00	50	0	270000
Mechanical	$240,000	30	$0	$80,000
Electrical	$500,000	30	$0	$167,000
Instrumentation	$48,000	20	$0	$0
Subtotal	$5,599,000			$2,645,000
Contractor General Conditions, Overhead, and Profit (15%)	$840,000			
Contingency (20%)	$1,120,000			
Engineering/Administration/Legal (22%)	$1,520,000			
Total Estimated Project Cost	**$9,080,000**			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$9,080,000	$9,080,000
Annual O&M Cost	$10,000	$191,800
Salvage Value	$2,645,000	($2,450,000)
Total Estimate of Present Worth		**$6,820,000**

Notes:
Present Worth estimated using discount rate of 0.4% *from EGLE*

Mount Pleasant DWSRF Monetary Evaluation
Distribution System Improvements
Project No. 230532

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost	
Water Meters	LS	1	$3,600,000	$3,600,000	
Distribution Valves	LS	1	$200,000	$200,000	
Portable Generator (Broomfield Well)	LS	1	$100,000	$100,000	
Emergency Connection (Union Township)	LS	1	$235,000	$235,000	
Subtotal				$4,135,000	
Contractor General Conditions, Overhead and Profit (10%)				$420,000	10%
Contingency (10%)				$420,000	10%
Engineering/Administration/Legal (5%)				$250,000	5%
Total Estimated Project Cost				**$5,230,000**	

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
1 1/2" Water Meters	$3,600,000	25	$0	$720,000
Distribution Valves	$200,000	25	$0	$40,000
Portable Generator (Broomfield Well)	$100,000	30	$0	$40,000
Emergency Connection	$235,000	25	$0	$50,000
Subtotal	$4,135,000			$850,000
Contractor General Conditions, Overhead and Profit (10%)	$420,000			
Contingency (10%)	$420,000			
Engineering/Administration/Legal (5%)	$250,000			
Total Estimated Project Cost	**$5,230,000**			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$5,230,000	$5,230,000
Annual O&M Cost	$3,000	$60,000
Salvage Value	$850,000	($790,000)
Total Estimate of Present Worth		**$4,500,000**

Notes:
Present Worth estimated using discount rate of 0.4% *from EGLE*

No Action

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$0	$0
Annual O&M Cost	$50,000	$960,000
Salvage Value	$0	$0
Total Estimate of Present Worth		**$960,000**

Notes:
Present Worth estimated using discount rate of 0.4% *from EGLE*

Mount Pleasant DWSRF Monetary Evaluation
Distribution System Improvements-LSLR
Project No. 230532

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost	
Lead Service Line Replacements	LS	1	$250,000	$250,000	
Subtotal				$250,000	
Contractor General Conditions, Overhead and Profit (10%)				$30,000	10%
Contingency (10%)				$30,000	10%
Engineering/Administration/Legal (5%)				$20,000	5%
Total Estimated Project Cost				$330,000	

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
Emergency Connection	$250,000	50	$0	$150,000
Subtotal	$250,000			$150,000
Contractor General Conditions, Overhead and Profit (10%)	$30,000			
Contingency (10%)	$30,000			
Engineering/Administration/Legal (5%)	$20,000			
Total Estimated Project Cost	$330,000			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$330,000	$330,000
Annual O&M Cost	$3,000	$60,000
Salvage Value	$150,000	($140,000)
Total Estimate of Present Worth		$250,000

Notes:
Present Worth estimated using discount rate of 0.4% *from EGLE*

Appendix 2

County Element Data

The lists include all elements (species and natural communities) for which locations have been recorded in MNFI's database for each county. Information from the database cannot provide a definitive statement on the presence, absence, or condition of the natural features in any given locality, since much of the state has not been specifically or thoroughly surveyed for their occurrence and the conditions at previously surveyed sites are constantly changing. The County Elements Lists should be used as a reference of which natural features currently or historically were recorded in the county and should be considered when developing land use plans.

Choose a county Isabella

Isabella County

Code Definitions

Species

Scientific Name	Common Name	Federal Status	State Status	Global Rank	State Rank	Occurrences in County	Last Observed in County
Alasmidonta marginata	Elktoe		SC	G4	S3?	2	2015
Alasmidonta viridis	Slippershell		T	G4G5	S2S3	8	2020
Ammodramus savannarum	Grasshopper sparrow		SC	G5	S4	7	2007
Bombus affinis	Rusty-patched bumble bee	LE	SC	G2	SH	1	1965
Bombus pensylvanicus	American bumble bee		SC	G3G4	S1	1	1965
Bombus terricola	Yellow banded bumble bee		SC	G3G4	S2S3	1	1937
Calypso bulbosa	Calypso or fairy-slipper		T	G5	S2	1	1892
Carex haydenii	Hayden's sedge		X	G5	SX	1	1934
Carex wiegandii	Wiegand's sedge		SC	G4G5	S3	1	1992
Centronyx henslowii	Henslow's sparrow		E	G4	S3	2	2006
Cypripedium arietinum	Ram's head lady's-slipper		SC	G3	S3	2	1928
Emydoidea blandingii	Blanding's turtle		SC	G4	S2S3	7	2021
Gallinula galeata	Common gallinule		T	G5	S3	1	2009
Gavia immer	Common loon		T	G5	S3	2	2021
Glaucomys sabrinus	Northern flying squirrel		SC	G5	S5	4	1989
Glyptemys insculpta	Wood turtle		SC	G3	S2	10	2022
Haliaeetus leucocephalus	Bald eagle		SC	G5	S4	6	2021

Scientific Name	Common Name	Federal Status	State Status	Global Rank	State Rank	Occurrences in County	Last Observed in County
Hybanthus concolor	Green violet		SC	G5	S3	1	1970
Jeffersonia diphylla	Twinleaf		SC	G5	S3	1	1977
Lasmigona compressa	Creek heelsplitter		SC	G5	S3	4	2015
Lasmigona costata	Flutedshell		SC	G5	SNR	7	2020
Ligumia recta	Black sandshell		E	G4G5	S1?	3	2020
Lithobates palustris	Pickerel frog		SC	G5	S3S4	4	2009
Moxostoma duquesnei	Black Redhorse		SC	G5	S2	2	1927
Myotis lucifugus	Little brown bat		SC	G3G4	S1	1	1996
Pandion haliaetus	Osprey		SC	G5	S4	1	1992
Pisidium idahoense	Giant northern pea clam		SC	G5	SNR	1	1927
Ptychobranchus fasciolaris	Kidney shell		SC	G4G5	S2	1	2020
Rallus elegans	King rail		E	G4	S2	1	1967
Sisyrinchium strictum	Blue-eyed-grass		SC	G3	S2	1	1898
Spiza americana	Dickcissel		SC	G5	S3	4	2007
Symphyotrichum praealtum	Willow aster		SC	G5	S3	1	1977
Terrapene carolina carolina	Eastern box turtle		SC	G5T5	S2S3	1	1964
Venustaconcha ellipsiformis	Ellipse		SC	G4	S3	9	2020
Villosa iris	Rainbow		SC	G5	S3	10	2020

Natural Communities

Community Name	Global Rank	State Rank	Occurrences in County	Last Observed in County
No natural communities found for this county				